

For Reference

NOT TO BE TAKEN FROM THIS ROOM

Ex LIBRIS
UNIVERSITATIS
ALBERTENSIS



THE UNIVERSITY OF ALBERTA

AN INVESTIGATION OF THE EFFECTS OF ILLUSTRATIONS
ON THE READING COMPREHENSION OF GOOD READERS
AND POOR READERS IN GRADE FOUR

by



SYLVIA MARIE HANNAH

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF EDUCATION

DEPARTMENT OF ELEMENTARY EDUCATION

EDMONTON, ALBERTA

FALL, 1976

ABSTRACT

The practice of including illustrations with the text of most reading material for elementary school children needs to be evaluated in terms of its usefulness to the reader. Existing research evidence regarding the effects of pictures on children's reading comprehension is inconclusive. That is, pictures may or may not facilitate comprehension. This study sought to further investigate the differences, if any, in children's reading comprehension of written discourse when illustrations were included with a text and when they were not.

The sample consisted of 60 grade four children from the Edmonton Public School System. Thirty of these subjects, whose percentile rank on the paragraph meaning subtest of the Stanford Achievement Test was at or above 75 were defined as good readers. Thirty subjects, whose percentile rank was at or below 25 on the same test, were defined as poor readers.

To secure the desired information, each subject was first asked to read either an illustrated or an unillustrated copy of the children's storybook Caps for Sale. Fifteen subjects from each reading group read the illustrated version and 15 read the unillustrated version. Each subject was then given the Rystrom Reading Comprehension Test, an instrument based on the text of the storybook. The test consists of 57 multiple-choice questions dealing

with vocabulary, syntax, item recall, item sequence, interpretation, and evaluation.

Subjects' total comprehension and subtest comprehension scores were computed and analyzed by the two-way analysis of variance statistical procedure. The significance of the treatment main effect and of the interaction between level of reader and treatment given were tested for total test comprehension and for subtest comprehension.

The results indicated that the inclusion of illustrations in children's reading material did not significantly affect total test comprehension. Vocabulary, item recall, item sequence, interpretation, and evaluation comprehension were not significantly affected, either, although subjects in the picture condition did perform better on twelve of the fourteen sets of group means. Comprehension on the syntax subtest was significantly higher when the illustrated version of the story was used. Concerning the interaction between level of reader and treatment given, results indicated that good readers and poor readers were not differentially affected by illustrations on any of the measures tested.

Several implications arising from the findings may be of particular interest to classroom teachers and publishers of children's reading materials. In addition, this study raised several questions and suggested areas worthy of further investigation.

ACKNOWLEDGEMENTS

I wish to acknowledge the assistance provided by many people throughout the course of this investigation.

Dr. M. Patricia Browne who guided the study and willingly gave help and encouragement throughout the investigation.

Dr. William T. Fagan and Dr. R. N. MacGregor who served as members of the committee and whose suggestions were greatly appreciated.

Dr. Daiyo Sawada who gave advice concerning the statistical analysis.

The principals and teachers of Capilano, Delwood, Evansdale, and Thorncliffe Elementary Schools who were interested and cooperative.

My fellow graduate students and friends who gave much support.

Mrs. Margaret Voice who typed the thesis so competently.

My husband, Ron, who supported and helped in numerous ways.

TABLE OF CONTENTS

CHAPTER	PAGE
1. PURPOSE OF THE STUDY	1
STATEMENT OF THE PROBLEM	2
DEFINITIONS	3
RESEARCH QUESTIONS	4
LIMITATIONS	6
ASSUMPTIONS	7
IMPORTANCE OF THE STUDY	8
OVERVIEW OF THE STUDY	9
2. REVIEW OF RELATED RESEARCH	11
STUDIES DEALING WITH THE EFFECTS OF PICTURES ON READING COMPREHENSION	11
Studies in the 1930's and 1940's	12
Studies in the 1950's	16
Studies in the 1960's and 1970's	18
SUMMARY	26
3. THE DESIGN OF THE STUDY	28
SELECTION OF THE POPULATION	28
Description of the <u>Stanford</u> <u>Achievement Test</u>	28
Use of the <u>SAT</u> in the Present Study . .	29
Selection of Fourth Grade Subjects	30
THE SAMPLE	31
THE ORIGINAL VERSION OF THE <u>RRCT</u>	31
Background	31

CHAPTER	PAGE
Description of the <u>RRCT</u> Reading Material	34
Description of the <u>RRCT</u> Test Questions	35
Rystrom's Administration Procedures	36
THE REVISED VERSIONS OF THE <u>RRCT</u> USED IN THIS STUDY	36
Background	36
Description of the Illustrated Revised Version of the <u>RRCT</u>	37
Description of the Unillustrated Revised Version of the <u>RRCT</u>	37
Description of the Test Questions	38
THE PILOT STUDY	38
Summary of the Results of the Pilot Study	41
OVERVIEW OF THE MAIN STUDY	41
TREATMENT OF THE DATA	42
ANALYSIS OF THE DATA	42
SUMMARY	43
4. ANALYSIS OF THE DATA	44
RELIABILITY FOR THE PRESENT ADMINISTRATION OF THE <u>RRCT</u>	44
RESULTS OF THE ANALYSIS OF THE RESEARCH QUESTIONS	47
Research Question I	48
Null Hypothesis I	49
Discussion	49
Research Question II	51

CHAPTER	PAGE
Null Hypothesis II	51
Discussion	51
Research Question III	55
Null Hypothesis III	55
Discussion	55
Research Question IV	56
Null Hypothesis IV	56
Discussion	56
Summary	57
CRITIQUE OF THE <u>RRCT</u> SYNTAX SUBTEST	58
SUMMARY	63
5. SUMMARY AND CONCLUSIONS	65
SAMPLE	65
THE TESTING INSTRUMENT	66
Reading Material	66
Test Questions	67
TREATMENT PROCEDURES	68
FINDINGS	69
LIMITATIONS	71
CONCLUSIONS AND DISCUSSION	73
RECOMMENDATIONS FOR FURTHER RESEARCH	77
BIBLIOGRAPHY	80
APPENDICES	
A. RYSTROM'S STORY FORMAT OCTOBER 1969	86
B. <u>RYSTROM READING COMPREHENSION TEST</u> AND ANSWER KEY	90

APPENDICES

PAGE

C.	TESTING PROCEDURE FOR PILOT STUDY AND MAIN STUDY	103
D.	SUBJECTS' TEST COMPLETION TIMES AND WORDS REQUESTED	106
E.	SUBJECTS' RESPONSES TO PICTURES	109
F.	RAW SCORES ON TOTAL <u>RRCT</u> AND SUBTESTS	112
G.	SOURCES OF INFORMATION AVAILABLE TO SUBJECTS ANSWERING <u>RRCT</u> QUESTIONS	117

LIST OF TABLES

TABLE	PAGE
1. RELIABILITY COEFFICIENTS FOR TOTAL <u>RRCT</u> AND SUBTESTS	46
2. GROUP MEANS BASED ON TOTAL SCORES ON THE <u>RRCT</u>	49
3. SUMMARY OF THE ANALYSIS OF VARIANCE FOR TOTAL COMPREHENSION ON THE <u>RRCT</u> AS RELATED TO PICTURE CONDITION <u>AND</u> LEVEL OF READER	50
4. GROUP MEANS BASED ON SUBTEST SCORES ON THE <u>RRCT</u>	52
5. SUMMARY OF THE ANALYSIS OF VARIANCE FOR SUBTEST COMPREHENSION ON THE <u>RRCT</u> AS RELATED TO PICTURE CONDITION AND LEVEL OF READER	53
6. PERCENTAGE OF CORRECT RESPONSES ON SYNTAX SUBTEST OF THE <u>RRCT</u>	61

LIST OF FIGURES

FIGURE	PAGE
1. RYSTROM READING COMPREHENSION MODEL	33
2. GROUP MEANS ON SYNTAX SUBTEST OF <u>RRCT</u>	54
3. SYNTAX QUESTIONS FROM THE <u>RRCT</u>	59

Chapter 1

PURPOSE OF THE STUDY

Even the most cursory examination of tradebooks and textbooks written for lower and middle elementary school children reveals the prevalence of illustrations. In most instances, the illustrations are adjuncts to the written discourse, in that the text should be comprehended even when the illustrations are removed. Because most illustrations are used in this way it is important to know, specifically, if they do play a role in children's reading comprehension.

With reference to the widespread practice of including pictures in children's reading material, Chall (1967) found that, in general, children's textbook authors, publishers, and school administrators, defended this educational decision on emotional grounds rather than with sound pedagogical reasoning. Authors perceived that teachers wanted pictures included in children's books. Chall indicated that one author felt that teachers had not, in fact, clearly considered why they preferred to use texts having accompanying illustrations. That author stated that "illustrations are an important selling point for teachers. Teachers can't select readers on important criteria so they use irrelevancies, like illustrations"

(Chall, 1967, p. 70). Another point made by several authors was that competition from other publishers kept them from cutting down on illustrative content. Authors also claimed that there was little evidence to suggest that pictures detract from the learning to read process, or that they enhance it.

It appears that illustrations are included in children's books for commercial reasons rather than for their possible pedagogical value. Whether illustrations have value in furthering children's reading comprehension is an issue that has not been fully explored. It is the purpose of this study to attempt further clarification of this question.

STATEMENT OF THE PROBLEM

The major problem investigated in this study was the determination of the differences, if any, in children's comprehension of written discourse when illustrations were included with a text and when they were not. Specifically, the problem was to determine if there were significant differences in the total reading comprehension scores of subjects when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension was measured by total scores on the Rystrom Reading Comprehension Test. Furthermore, two sub-problems were investigated: (1) Were there

significant differences in the subtest comprehension scores of subjects when they read the illustrated or unillustrated version of Caps for Sale, when comprehension was measured by subtest scores on the Rystrom Reading Comprehension Test? and (2) Were the reading comprehension scores of good versus poor fourth grade subjects differentially affected when they read the illustrated or unillustrated version of Caps for Sale, when comprehension was measured by total scores and subtest scores on the Rystrom Reading Comprehension Test?

DEFINITIONS

A number of terms which have meaning specific to this study are defined as follows:

1. Reading Material: refers specifically to the children's storybook Caps for Sale by Esphyr Slobodkina, 1970.
2. Illustrations: refers to the coloured illustrations drawn by the author of Caps for Sale and included with the regular edition of the storybook. This term was used interchangeably with the term "pictures."
3. Total Reading Comprehension: refers to subjects' total scores on the Rystrom Reading Comprehension Test (Experimental Edition, September, 1969).
4. Subtest Comprehension: refers to subjects' scores on the six subtests of the Rystrom Reading

Comprehension Test, which included vocabulary, syntax, item recall, item sequence, interpretation, and evaluation.

5. Good Readers: refers to grade four subjects whose percentile rank on the paragraph meaning subtest of the Stanford Achievement Test, administered in April-May, 1974, was at or above 75 using grade three school system norms.

6. Poor Readers: refers to grade four subjects whose percentile rank on the paragraph meaning subtest of the Stanford Achievement Test, administered in April-May, 1974, was at or below 25 using grade three school system norms.

RESEARCH QUESTIONS

For the purpose of this investigation the four research questions below were devised. Null hypotheses were developed in order to carry out the tests for statistical significance. The research questions and their corresponding null hypotheses are as follows.

Research Question I

Will there be significant differences in the total reading comprehension scores of good and poor fourth grade readers when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by total scores on the Rystrom Reading Comprehension Test?

Null Hypothesis I. There will be no significant difference between picture and no-picture

group means for total reading comprehension on the Rystrom Reading Comprehension Test.

Research Question II

Will there be significant differences in the subtest comprehension scores of good and poor fourth grade readers when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by subtest scores on the Rystrom Reading Comprehension Test?

Null Hypothesis II. There will be no significant differences between picture and no-picture group means for subtest comprehension on the Rystrom Reading Comprehension Test.

Research Question III

Will the total reading comprehension scores of good versus poor fourth grade readers be differentially affected when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by total scores on the Rystrom Reading Comprehension Test?

Null Hypothesis III. There will be no interaction between level of reader and treatment given for total reading comprehension on the Rystrom Reading Comprehension Test.

Research Question IV

Will the subtest comprehension scores of good versus poor fourth grade readers be differentially

affected when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by subtest scores on the Rystrom Reading Comprehension Test?

Null Hypothesis IV. There will be no interaction between level of reader and treatment given for subtest comprehension on the Rystrom Reading Comprehension Test.

LIMITATIONS

This study was subject to certain limitations arising from decisions made in the initial planning of the investigation.

1. The Rystrom Reading Comprehension Test was an experimental version of a reading comprehension instrument. Data have been recorded on its reliability and validity (Rystrom, 1970a, 1970b) but no norms for the instrument are presently available. As well, several of the subtests include limited numbers of items and the findings from these are necessarily limited in generalizability.

2. The Rystrom Reading Comprehension Test was not altered for this investigation. Whatever the possible weaknesses regarding particular items and/or subtests, no changes were made prior to the present use of the test.

3. The multiple-choice format of the comprehension instrument was subject to the weaknesses inherent in such a measuring device.

4. The sample for this study was chosen from 13 grade four classrooms in the Edmonton Public School System, and therefore generalizability of the results is necessarily limited.

5. The subjects' previous instruction concerning the use of pictorial content when reading was not accounted for or investigated, therefore the influence of any prior instruction in this area could not be measured.

ASSUMPTIONS

The null hypotheses tested in this investigation were based upon the following assumptions:

1. That the most recent paragraph meaning scores on the Stanford Achievement Test accurately defined subjects' present reading comprehension levels.

2. That all administrations and scorings of the Stanford Achievement Test followed the standardized procedures outlined for the test.

3. That the present experimental setting and administration would not interfere with subjects' comprehension of the reading material.

4. That subjects would respond honestly regarding previous exposure to the reading material used in the study.

5. That the Rystrom Reading Comprehension Test was an appropriate instrument to investigate the problems outlined in this study.

IMPORTANCE OF THE STUDY

Studies which have investigated the effects of illustrations on children's reading comprehension have generally produced either inconclusive or contradictory results, suggesting a need for further research in this area.

Research in the 1930's through the 1950's tended to deal rather globally with reading comprehension, as it was related to illustrated and unillustrated reading material. Moreover, many of the measures of reading comprehension were open to question. In response to this, studies in the 1960's and 1970's attempted to make the measure of comprehension more specific. In a continued effort to measure reading comprehension explicitly, the present study investigated six areas of reading comprehension as defined by the Rystrom Reading Comprehension Test: vocabulary, syntax, item recall, item sequence, interpretation, and evaluation, to determine the possible influence of illustrations on these particular aspects of comprehension.

A further concern of this study was to ascertain whether the reading comprehension of good readers and poor readers was affected differentially when illustrations were included with textual material. If differences were noted, this would suggest that instructional procedures as they relate to the use of illustrations may need to be examined.

Apart from the theoretical concerns, if the study showed that illustrations did not help children better understand textual material, it could be argued at a more practical level that materials for reading instruction might be produced more inexpensively in the future by omitting the illustrations.

OVERVIEW OF THE STUDY

Chapter 1 has dealt with the purpose of the study. It included a statement of the problem and sub-problems to be investigated; the definitions of the terms used; the research questions and corresponding null hypotheses examined and tested; the limitations of the study; the assumptions underlying the study; and the importance of the present research.

Chapter 2 presents a review of the literature and research which gave direction to the present study.

Chapter 3 includes a description of the design of the study: the population, the sample, the instrument used, the collection and treatment of the data, and the statistical procedures employed.

Chapter 4 consists of an analysis of the data and a summary of the findings related to the research questions asked and the null hypotheses tested.

Chapter 5 includes a final summary of the study and conclusions arising from the findings. Implications and

suggestions for further research are also given in this chapter.

Chapter 2

REVIEW OF RELATED RESEARCH

Some authors, notably those in the field of linguistics (Bloomfield and Barnhart, 1961; Fries, 1966), have questioned the utility of including illustrations in material designed to teach children to read words, and have accordingly published school textbooks without illustrations. However, most children's reading materials do contain illustrations and this practice has not been seriously questioned by many educators. Research evidence is available concerning the effects of pictures on learning and, according to Samuels (1970), falls into three main areas: the effects of pictures on learning to read, the effects of pictures on comprehension, and the effects of pictures on attitudes. The present study dealt specifically with the second concern: the effects of pictures on comprehension. The following review of the research, therefore, involves those studies which focus on the effects of pictures on reading comprehension, especially at the elementary level.

STUDIES DEALING WITH THE EFFECTS OF PICTURES ON READING COMPREHENSION

The research reported here is presented and analyzed in chronological order since investigators in this

area have themselves attempted, for the most part, to build upon previous studies and have developed increasingly more sophisticated research designs.

Studies in the 1930's and 1940's

As early as the 1930's there is evidence that educators were questioning the value of including illustrations in materials used for teaching reading as a subject area. The early studies (Goodykoontz, 1936; Miller, 1938), however, were very loose in design, thus limiting their interpretation.

While Goodykoontz did not deal directly with effects of illustrations on reading comprehension, her evidence suggested that pictures could supply information to a reader in a way that could enhance comprehension. Goodykoontz' grade six to grade eight subjects were presented with an illustrated booklet and, after having read it, were required to answer 26 questions: 13 dealing with the text alone and 13 dealing with the pictures alone. The subjects answered an average of nine of the 13 text questions accurately whereas they answered an average of only four of the 13 picture questions correctly. Goodykoontz suggested that these differences could be explained, in part, by the fact that subjects did not always attend to the pictures. (She reported that 6% of the subjects did not appear to look at the pictures at all.) In a second part of the study, Goodykoontz presented the same

illustrations, without the text, to grade six subjects in an attempt to determine whether pictures alone could provide information to children. When presented with only the illustrations, subjects answered an average of eight of the 13 questions correctly. Goodykoontz concluded that when pictures are the only source of information they can provide almost as much information as textual material. If pictures do indeed provide children with information, this suggests that illustrations might be included in children's reading materials for the purpose of providing information which reinforces the text or is supplementary to it.

Goodykoontz' observation that some subjects seemed to ignore the illustrative material was taken into account in the present study, in that the investigator did try to determine whether or not subjects attended to the illustrations while reading the textual material used here.

Miller's (1938) study came closer to a controlled experimental study of the influence of illustrations on children's reading comprehension. He had 600 grades one, two, and three children use primary basal readers with and without illustrations. One hundred subjects in each grade read illustrated stories from the basal readers and one hundred read the same stories in which the illustrations were covered. Subjects were assigned to the two groups on the basis of their matched reading scores on a standardized reading test given prior to the experiment. Miller first

tested his subjects' reading comprehension of three illustrated or three unillustrated stories from the basal readers, and, after they had used the readers, illustrated or unillustrated, for an entire semester, he gave another reading comprehension test. Miller reported no statistically significant differences in the reading comprehension of the groups either after reading three stories or after completing the primary basal readers. Unfortunately, while Miller's results are interesting, there were several limitations in the design of his study which must be considered in interpreting his results. Miller did not report any details about the specific nature of the materials—he only referred to them as primary basal readers. Second, children reading the illustrated and unillustrated texts were often in the same classrooms. It is obvious that either group would have had some access to the reading materials of the other group and this might have contaminated Miller's results. Also, several of Miller's measures of comprehension were unique to his study. For instance, children were asked to identify a word spoken by the teacher from a printed group of words, to choose from two printed phrases the phrase spoken by the teacher, and to delete the extraneous word from a group of three words. The first two measures involve word recognition and the latter measure, although requiring meaningful associations among words, does not directly

focus on the comprehension of a given passage. Miller also required subjects to complete unfinished sentences after reading a related paragraph, and to put the happenings in a paragraph into proper sequence. Both of these measures have greater generalizability as measures of reading comprehension than do the first three, however Miller included no examples of his questions, thereby making a complete analysis difficult. Thus, although Miller did question the influence of illustrations on children's reading comprehension and was one of the first to experimentally test his suspicions, one needs to be cautious about generalizing from his findings.

Halbert (1944) investigated the effect of pictures on the recall of relevant ideas from a story. Two hundred and ninety-four subjects, aged 8 1/2 to 12 years, read illustrated and unillustrated stories and were required to retell them as accurately as they could. Their responses were evaluated, in part, according to the number of relevant ideas each subject could state. Relevant ideas were previously defined by Halbert as summary statements and descriptions of details, events, and/or principles. Subjects in the text-plus-pictures groups produced more relevant ideas than subjects in the text-only groups. As well, good and average readers gave more relevant responses than did poor readers. Again, as in the case of Miller's study, a major problem in interpreting the

results rests in the limited information provided about the actual measures of comprehension and about the role of the pictures in the materials used. For example, were the pictures adjuncts to the textual material or did they more fully emphasize the message of the author? And did the examiner focus upon relevant ideas which would be enhanced by the illustrations and which might not have been so obvious in the text alone?

In the present study, each of the pictures is clearly an adjunct to the textual material. Since the test questions were devised for the unillustrated text, there was no question about the illustrations affecting the nature of the questions asked. In other words, subjects reading the illustrated version were in no way at an advantage on the basis of selectivity of questions. Halbert's findings regarding differences among good readers and poor readers led the present investigator to consider those differences in the present study.

Studies in the 1950's

Vernon carried out two studies, one in 1953 and one in 1954, that dealt with the value of illustrations included with textual material. Vernon (1953) investigated whether pictures helped or hindered the acquisition of knowledge from a text. Two short articles were prepared, with two versions of each; one version accompanied by photographs and the other by graphs. After reading a

version of each article, the 62 subjects were asked to recall orally what the stories had been about and their reports were scored by the number of major points and details remembered and for their general coherence and logical consistency. The number of points remembered was not significantly different whether subjects read the pictorial or non-pictorial versions of the articles. Vernon did find, however, that certain major points in the texts were better recalled by the picture group. For example, a picture of a slum caused many subjects to remark on the evils of slum housing. While pictures aided the recall of some points, they did not assist readers in remembering the explanatory and relational statements present in the articles nor did they affect the consistency and coherence of the responses. Vernon concluded that ". . . the pictures had little effect one way or the other in helping the reader to gain a real understanding of what he read" (p. 186).

The first part of Vernon's 1954 study questioned whether pictures added to subjects' knowledge and understanding of material designed to instruct. Subjects were 11 and 12 years old and the reading material consisted of short (700-900 words) expository passages. Subjects were asked general questions after reading an illustrated version of one passage and an unillustrated version of another. The results suggested that the pictures did not

assist significantly in the understanding of the passages. Vernon stated that the material may have been too difficult for the subjects to assimilate and that they may have tried to memorize the text, a procedure which would not help them to answer general questions.

Although some of Vernon's comprehension measures were similar to Halbert's, she found that pictures did not necessarily facilitate the recall of ideas. Her material was designed to instruct and thus was probably more similar to the textbook material children deal with at school. But Vernon did suggest that this material may have been difficult for her subjects to assimilate. This suggestion led the present investigator to consider carefully the match between reading material grade level and subjects' grade level in the present study.

Vernon's work suggested, as well, that certain measures of reading comprehension might be differentially affected by illustrations included with textual materials. The present study continued to investigate this finding by measuring picture influence on six defined areas of reading comprehension.

Studies in the 1960's and 1970's

A survey of studies from the 1930's through the 1950's indicated that comprehension measures needed to be clearly defined, purposes for the written materials and for the included pictures elucidated, and firm experimental

controls and statistical analyses continued. The more recent studies of Weintraub (1960), Koenke (1968), Koenke and Otto (1969), Pederson (1970), and Bluth (1972) are discussed here in relation to these points.

Weintraub (1960) and Koenke (1968) made the measure of comprehension more explicit by focussing on readers' abilities to give the main thought or main idea of a passage since this might be especially affected by illustrations.

Weintraub (1960), using good readers from three grade three classes, exposed each subject to (1) a short story without pictures, (2) a short story with pictures, and (3) pictures alone. He then measured what he defined as main idea responses under each condition. Weintraub's questions dealt with movements, descriptions, and reasons for characters' actions. He used texts and illustrations as they appeared in a published reading series and thus did not directly control the relationship between text and pictures. Weintraub concluded that children comprehend a main idea best in the text-only condition. The text-plus-pictures condition was next best and the pictures condition last. Koenke (1968) questioned Weintraub's statistical analyses and stated that the means of the groups in the text-only condition and in the text-plus-pictures condition were not significantly different. Despite these contradictory interpretations of the results, in either case, the conclusion is that illustrations do not enhance a

reader's ability to state the main idea of a passage. At best, they allow subjects using text plus pictures to make a main idea statement only as well as subjects using the text alone.

Weintraub's study suggested that even if a researcher did clearly limit and define the measure of reading comprehension investigated, he or she still might not find that illustrations included with texts would improve that measure of reading comprehension. The present study, by expanding the investigation of reading comprehension to six defined areas attempted to provide some evidence that illustrations could improve reading comprehension in one or more of these particular areas.

Koenke (1968) attempted to improve Weintraub's (1960) study by designing his own main idea paragraphs and by defining and constructing main idea pictures to include with the texts. Koenke noted Goodykoontz' (1936) finding that 6% of her subjects did not look at the pictures at all, and so devised a picture treatment in which grade three and grade six subjects who were exposed to pictures received either (1) no direction to view the pictures, (2) minimal direction, or (3) maximal direction. His 240 subjects were required to state the main ideas of three pictures, or three paragraphs (each four sentences long), or three paragraphs plus content-relevant pictures. Koenke noted Vernon's (1954) comments regarding the effect

that the difficulty of the reading material had on subjects' responses. He controlled for this by having half of the subjects in the text and text-plus-picture conditions read three basic paragraphs set at a grade one reading level and the other half of the subjects read three paragraphs at their grade placement (three or six) level. Responses were measured on a seven point scale and rated by three trained judges. Koenke found that exposure to a content-relevant picture did not enhance main idea responses nor did directions to view the pictures do so. The main idea responses of the grade six subjects were significantly better on the grade one paragraphs than on the grade six paragraphs. Grade three subjects did not respond significantly better on grade one paragraphs than on their grade placement paragraphs. This suggested that the simplification of the reading material was more successful in improving subjects' responses than were the illustration or direction treatments. Koenke's work suggested that even when the illustrations included with textual materials were purposively defined, they might not affect a reader's comprehension of those reading materials.

Koenke's findings that direction or lack of direction to view the illustrations made no statistical difference to reading comprehension led the present investigator to consider using uniform directions for all subjects in the study, and not to give a specific set of instructions

to the picture groups alone. Koenke's significant findings regarding simplification of the reading material suggested that the reading material used in the present study should offer even poor readers in grade four the advantage of using reading material below their present grade level.

In an attempt to improve on his 1968 study, Koenke, with the help of Otto (1969), devised another main idea experiment. They used longer reading passages, more like commercial reading materials, and black and white pictures which they defined as either specifically or generally relevant to the main ideas of the passages. Subjects from grade three and grade six read passages calculated to be at a fifth grade readability level. Each subject read three passages, each having a different format. Each saw a specifically relevant picture included with a passage, a generally relevant picture plus passage, and passage only. Main idea responses were assigned a value of one to five and evaluated by three trained judges. Koenke and Otto found that pictures were not of value to the grade three subjects. They stated that decoding problems probably kept these subjects from making use of the pictures, a result closely related to Koenke's (1968) findings concerning readability level. Grade six subjects had significantly higher scale ratings when pictures were present, whatever the type of picture included. However,

the authors stated that, generally, these subjects failed to understand the "gist" of the passages and tended to fixate on a single word or concept which was depicted in both types of pictures. They suggested that the material may have been too complex even for grade six subjects to find the main idea.

These results appeared contradictory to those found by Koenke in 1968. The difference was mainly a matter of interpretation. Although subjects had higher ratings when illustrations were present (in the 1969 experiment), their responses were not yet main idea responses. Illustrations perhaps pointed readers in the direction of a desired response but they could not ensure that this response would be complete and fully accurate.

Since the present study looks at a number of aspects of comprehension, and not just main idea, it may be found that illustrations lead subjects to respond more accurately in certain areas of reading comprehension, for example, in the areas of vocabulary, item recall, and interpretation.

Research up to the 1970's on the effects of illustrations on children's reading comprehension had, for the most part, focussed on ill-defined or inadequate measures of comprehension. Pederson (1970) attempted to broaden the scope of previous comprehension measures by testing selected literal and inferential comprehension skills

from Barrett's Taxonomy. Her measures of literal comprehension were: the recognition of details, main ideas, sequence, comparisons, cause and effect relationships, and character traits. Inferential comprehension included all of the above measures except the inferring of details. Pederson used five literal and five inferential questions for each reading passage. However not all of the types of literal and inferential skills were measured for every story, and Pederson did not include a breakdown of the number of questions asked for each skill. Since she asked so few questions it was difficult to derive satisfactory conclusions regarding the influence of pictures. As well, the inferential questions were multiple-choice and limited the subjects to the alternatives stated, a limitation also found in the present study.

Pederson noted a paucity of research in this area in which subjects' reading levels were controlled, so she chose subjects who were reading at one, one and one-half, and two years below grade placement. During the first week of Pederson's study, 30 poor grade three readers read three stories at their reading level from a published reading series, with the illustrations intact. In the second week, these subjects read three different stories at the same level and from the same series, from which the illustrations had been removed. Another 30 poor readers were exposed to the reading materials in the

reverse order. Pederson found no statistically significant differences in the overall means during the two weeks whatever the order of presentation or reading level of the subjects.

Pederson's results indicated that pictures did not improve the reading comprehension of low readers. It may be that the illustrations added no new information or no information pertinent to the questions being asked. Or subjects may not have known how to get information from the pictures.

The present study attempted to build upon Pederson's by also selecting several comprehension skills to measure. In addition, the readability of the material to be read was considerably below all subjects' attained grade level. Furthermore, good readers as well as poor readers were exposed to the same reading material in an attempt to measure any differential effects that illustrations might have on their reading comprehension.

A study by Bluth (1972) examined reading comprehension using the cloze technique. Eighty good readers and poor readers in the second grade read two different passages, each 125 words in length, from which every fifth word had been deleted. Inserted words were scored correct if they were exact replacements of the deleted words. One passage was presented consistently with a picture and the other without. Information was not available as to the

nature or reading level of the passages or about the relationship of the illustration to the passage. Good readers responded significantly better on the test when it was illustrated. With poor readers the response differences were not significant.

Bluth's study presents findings which need replication as the cloze measure of comprehension is a type of response format not previously used by researchers investigating this problem. A partial explanation of Bluth's results could be that good subjects were chosen from the top three stanines of a standardized reading achievement test and poor subjects were selected from the lowest three stanines. Poor subjects may have been so penalized by word recognition weaknesses that their understanding of the test format may have been minimal. The present study sought to alleviate possible word recognition difficulties by supplying the pronunciation of any words unknown to the subjects.

SUMMARY

The intent of this survey of research studies from the last forty years dealing with the influence of illustrations on reading comprehension was to show the extent of the investigations and to glean insights from the findings. Although it appeared that illustrations did not significantly aid comprehension, it was impossible to claim

that they had no influence.

Further research needs to be done on picture influences on reading comprehension when illustrations are not used as adjuncts to the reading material. The present study continued to use adjunctive-type illustrations.

Comprehension measures still need further exploration. For instance, Pederson's (1970) study might be duplicated with the inclusion of more questions for each area of comprehension. Or a test measuring numerous comprehension skills could be designed and possible differential effects of illustrations upon those skills might be ascertained. The present study investigated this possibility.

Pederson (1970) used low readers solely and found no significant picture influences on reading comprehension. Might good readers and poor readers both using material below their attained grade level be differentially affected by included illustrations? Again the present study explored this question.

Chapter 3

THE DESIGN OF THE STUDY

This chapter will describe the population, sample, original version of the testing instrument, revised versions of the testing instrument used in this study, data collection procedures, and the statistical treatment of the data.

SELECTION OF THE POPULATION

The population for this study included all students in 13 different classrooms from four elementary schools in the Edmonton Public School System. These schools had been identified by personnel in the School System as available to the investigator for the purposes of the study. The investigator was granted permission to examine the cumulative record cards of students in these classes in order to identify a population of good readers and poor readers according to performance on the paragraph meaning subtest of the Stanford Achievement Test, Primary II Battery.

Description of the Stanford Achievement Test

This test is designed for use with students from grades one to nine inclusive. The test is organized into

five batteries for the various grades and covers several subject areas. Primary II Battery is designed to be administered by the end of grade three and contains subtests for word meaning, paragraph meaning, spelling, word study skills, and language. The test authors sought content validity by examining the skills and knowledge taught in the various fields, and selecting a representative sample of questions to include in the subtests. Reliability coefficients for the subtests are high, ranging from .83 to .94 (SAT Manual, 1964).

The paragraph meaning subtest selected for use in the present study consists of a series of paragraphs, graduated in difficulty, from which one or more words has been omitted. Pupils demonstrate their comprehension of the paragraphs by selecting the proper word for each omission from a choice of four words. Students are stopped after 30 minutes and the examiner records their total correct responses. These raw scores may be normed using the grade, percentile, and stanine norming tables available with the SAT or they may be left as raw scores to be normed for specific school populations. The Edmonton Public School System has established local norms for the SAT and these were used in the present study.

Use of the SAT in the present study. The Stanford Achievement Test, Primary II Battery, had been administered by grade three teachers in the spring of 1974 as part of a

system-wide administrative policy. Teachers computed the test and subtest raw scores which were normed for the Edmonton Public School System by computer analysis. Since these test results were the ones most readily available at the time the present study was initiated, they were used for establishing the population of good readers and poor readers from which the final sample of pupils was drawn. Specifically, the profile sheets for all students were examined. Sixty-one good readers, those who scored at or above the 75th percentile, were identified. Seventy-two poor readers, those who scored at or below the 25th percentile, were further identified.

Selection of Fourth Grade Subjects

The fourth grade was selected as the most suitable testing level for the purposes of this study for several reasons. The main reason centred on the reading material chosen for the study. Because this study dealt with reading comprehension and not word identification, it was necessary that subjects reading below grade level be able to handle the reading material selected. The reading material used in this study was calculated to have a reading difficulty level of approximately mid-grade two (Fry, 1968; Spache, 1974). A further concern was that the content of the reading material be interesting even to subjects reading above grade level. Another reason concerned the use of pictures in basal readers. Read (1950),

for example, constructed a picture index for basal readers and found that there was a gradual and continual decline in the use of illustrations in basal readers as grade level increased. If the present study showed that pictures improved the reading comprehension of good and/or poor readers in grade four, educators and publishers might be alerted to halt the trend noted by Read.

It was decided that subjects from the fourth grade would meet the above conditions most satisfactorily.

THE SAMPLE

With the exception of two good readers and two poor readers who were chosen to participate in the pilot study, 30 good readers and 30 poor readers were randomly selected from the remaining 59 good and 70 poor readers. In all instances, randomness was achieved by consulting a random number table from Statistical Principles in Experimental Design (Winer, 1971). Furthermore, 15 subjects were randomly selected from each group to read the illustrated version of the text and 15 subjects in each group read the unillustrated text.

THE ORIGINAL VERSION OF THE RRCT

Background

The Rystrom Reading Comprehension Test (RRCT) is based on the text of the children's storybook Caps for

Sale by Esphyr Slobodkina. It was devised by Rystrom in 1969 and consists of 57 multiple-choice questions dealing with vocabulary, syntax, item recall, item sequence, interpretation, and evaluation comprehension.

Rystrom (1970a) reported that, after many conversations with reading teachers, he found few who taught from a fully formed concrete definition of reading comprehension. He therefore formulated a reading comprehension skill model based on the six areas identified above and designed the RRCT in an attempt to apply the model to the measurement of reading comprehension within the context of a particular story. Rystrom hoped that the particular areas suggested might alert teachers to the teaching possibilities inherent in such a model.

Figure 1 presents the comprehension model suggested by Rystrom (1970a).

With reference to the model (Figure 1), the components basic to the RRCT are defined as follows.

1. Vocabulary requires that the reader know the meaning of particular words as they are used in the specific context of the passage being read.

2. Syntax refers to the sentence patterns and syntactic items in the story from which the reader may gain understanding, using the meaning-overlap between words to achieve the meaning of complete sentences.

3. Item recall requires that the reader remember

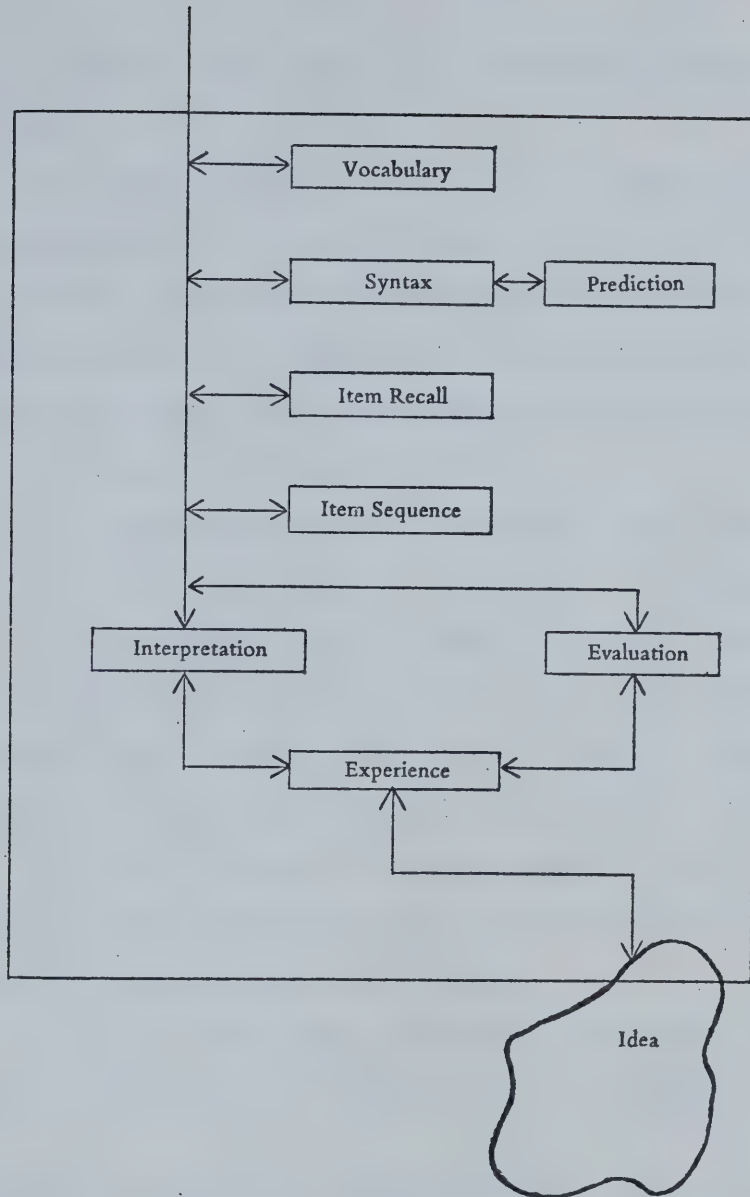


FIGURE 1

RYSTROM READING COMPREHENSION MODEL

Richard Rystrom, "Toward Defining Comprehension: A First Report," Journal of Reading Behaviour, II (1970), 59. (a)

specific items in the story which have been selected as significant.

4. Item sequence requires that the reader remember the sequence in which the above selected items occurred.

The two remaining comprehension skills are qualitatively more difficult than the previous four skills because they require that the reader infer conclusions not stated in a reading passage.

5. Interpretation has the reader make a connection between his own experience and the events in a story.

6. Evaluation has the reader look for internal and external consistency in the actions and events occurring in a passage and determine the degree to which the passage is consistent with itself and/or with the real world.

There is no linear learning sequence suggested by this model. The arrows are meant to indicate that recursiveness is both possible and likely.

For more information about the model, the reader is referred to Rystrom's (1970a) original position paper.

Description of the RRCT reading material. All test questions for the RRCT were based on the story, Caps for Sale, told and illustrated by Esphyr Slobodkina (1947). This book was illustrated and printed on six inch by eight inch paper. The test format for Rystrom's 1969 investigation consisted of the story (text only) typed on three 8 1/2 inch by 11 inch pages, with each paragraph of

the original book remaining in paragraph form in Rystrom's version, although Rystrom's typed lines were fewer and the words per line were more numerous than in the original. Slobodkina's book consisted of 21 pages of text, compared to Rystrom's three pages. There were 21 six-colour illustrations, drawn by the author, in the original. Rystrom eliminated these illustrations for his version. Appendix A shows the story format used by Rystrom for the investigation conducted in 1969.

Description of the RRCT test questions. Fifty-seven multiple-choice questions were developed from the reading material. The breakdown of the questions dealing with each of the six skill areas proposed by Rystrom's model is as follows:

Vocabulary	7
Syntax	10
Item Recall	14
Item Sequence	19
Interpretation	4
Evaluation	<u>3</u>
Total	57

The test booklet was 10 pages in length and questions and answers were typed on 8 1/2 inch by 11 inch paper. Three or four possible correct answers were supplied for each question and subjects were directed to underline the best answer. Appendix B presents the complete text of the RRCT

and the answer key.

Rystrom's Administration Procedures

The RRCT was first administered by Rystrom in October, 1969, to six grade four classes in Georgia. Two of the classes were comprised of remedial readers and the other four represented a cross section of fourth graders. In every instance the test was administered to entire classroom groups. Internal consistency reliability was measured by correlating performance on the odd and evenly numbered items. The reliability coefficients for the six classes ranged from .70 to .98 with the average reliability being .84. Concurrent validity was measured by correlating scores on the RRCT with scores on the California Reading Test, which had also been administered in each classroom. Correlation coefficients ranged from .84 to .91 with an average correlation of .86.

Based on the above coefficients, the RRCT appears to be a reliable and valid instrument of reading comprehension. As such, and because it is based upon an actual children's storybook, it was deemed an appropriate instrument for this investigation.

THE REVISED VERSIONS OF THE RRCT USED IN THIS STUDY

Background

For this investigation, two versions of the reading

material for the RRCT were required: an illustrated version and an unillustrated version. The investigator secured an illustrated version of the text, Caps for Sale, and produced a second unillustrated version in the same format. The following sections describe both versions of the test and the present administration of the two revised versions of the RRCT.

Description of the illustrated revised version of the RRCT.

The paperback edition of Caps for Sale, published by Scholastic Book Services in October, 1970, was used as the reading material for the illustrated version of the test. This book was six inches by eight inches and included 23 pages of text.

The original (1947) story listed the colours of the caps as gray, brown, blue, and red. The later (1970) edition listed them as brown, white, gray, and red. This alteration was necessary because the paperback edition displayed only five colours instead of the original six. Test questions and answers were not affected by this change.

There were 23 five-colour illustrations in the 1970 edition. These illustrations were identical to the original edition except for intensity of colour and the colour exchange indicated above.

Description of the unillustrated revised version of the RRCT. To maximize treatment effect, the unillustrated

version of the book was designed as similarly to the paperback edition as was possible. The unillustrated version was prepared by photo-copying each page of text from the paperback edition onto paper of similar weight. Each page was then cut to the original size and the pages stapled together into booklet form. A cover of heavier weight paper, displaying the original style of lettering for book title and author, was glued to the prepared booklet.

Description of the test questions. The test questions and format devised by Rystrom (see Appendix B) were not altered for the present study. Subjects answered the same set of questions whatever version of the reading material they used.

In order to test the administration procedures first outlined by Rystrom, a pilot study was initiated. The results of that study are presented in the next section.

THE PILOT STUDY

The pilot study was conducted in April, 1975. The investigator sought to retain as much of Rystrom's (1970b) procedure as was possible. However, since Rystrom's administration involved entire classroom groups and this study selected and tested subjects individually, there were several points needing clarification.

Because Rystrom had designed a comprehension

test and not a test of decoding skills, his subjects were given assistance with the pronunciation of unknown words from the story and/or the test questions. This procedure was followed in the present investigation and a record kept of the word(s) requested by each subject. Rystrom gave his subjects no information regarding word meanings, a procedure retained here. Rystrom's subjects were told that they could read the story as many times as they wished and that they would be asked some questions about it afterwards. Subjects in the present study were asked to read the story only once and were told that they would be asked questions about it. Rystrom's subjects exchanged the story for the test questions, another procedure followed here.

As was stated in chapter two, Koenke (1968) had noted Goodykoontz' (1936) observation that some subjects did not look at the pictures included with textual material, and so had directed some of his subjects to look at the pictures in his study. Since Koenke found no significant differences in comprehension among his subjects, whether he directed their attention to the pictures or not, no specific instructions to view the illustrations were given to subjects in the pilot study. However, if it were found that subjects in the pilot study who used the illustrated book paid no attention to the illustrations, instructions to subjects in the picture condition would be altered for

the main study.

Because Caps for Sale might be available in school classrooms and libraries, it was considered necessary to ask subjects whether they had previously read the story-book. It was decided to eliminate from the main study those subjects who had read the story or were familiar with it (by having seen a film, for example), since failure to eliminate these subjects would introduce internal invalidity to the study through differential subject selection.

Appendix C indicates the procedure followed by the investigator during the pilot study. Subjects came to an empty room individually. The investigator sat at right angles to them in order to observe, closely but unobtrusively, their responses to the illustrations. Four subjects were tested in the pilot study: two good readers and two poor readers, one good reader and one poor reader using the illustrated book and the other good and other poor reader using the unillustrated version. Total administration time for each subject was not less than 10 minutes and not more than 30 minutes.

The test directions and procedures were clear and well understood, as evidenced by observation of subjects' responses.

Both subjects who read the illustrated story noticed most or all of the pictures even if their attention

to them was labelled by the investigator as "glancing at," rather than "looking at," the illustrations.

One subject in the pilot study had read the story and one subject knew a story similar to it. The other two subjects were not familiar with the story.

Summary of the Results of the Pilot Study

On the basis of the pilot study, it was decided to transfer all previously outlined procedures to the main study, including the presentation of identical directions to all subjects and the elimination of subjects familiar with the reading material.

OVERVIEW OF THE MAIN STUDY

Twenty-four subjects from the original sample of 60 had to be eliminated from the main study. In one school most subjects were eliminated since two of the three classrooms had seen a film of the story earlier in the year. Twenty-four more subjects were randomly selected and included in the appropriate groups to bring the sample back to 60 pupils. Testing was carried on during the last week of April and the first two weeks of May, 1975. Sixty subjects were tested.

Records were kept of subjects' requests for unknown words from the story and/or test, and of the time taken to read the story and complete the test. Appendix D presents this information, arranged according to group

and treatment.

The responses of subjects in the picture groups, to the illustrations, are given in Appendix E. The investigator observed that none of the subjects ignored completely all of the illustrations although some subjects gave them more attention than did others.

TREATMENT OF THE DATA

Each subject in the study was given an identification number and labelled according to group and treatment. Subjects' total comprehension and subtest comprehension scores were computed by the investigator and all of the above information was transferred to summary sheets.

Once these data were prepared, they were punched onto IBM computer cards in order to facilitate statistical analysis.

ANALYSIS OF THE DATA

The Kuder-Richardson procedure for estimating reliability (TEST Ø1, a computer program documented by the Division of Educational Research Services, University of Alberta, Edmonton) was applied to the data collected in this administration of the RRCT.

The two-way analysis of variance (Computer Program ANCV2Ø) was the basic statistical test used in this study. An F value significant at the .05 level was

established as the level at which the corresponding null hypothesis could be rejected.

The following analysis was made of the data:

1. The treatment main effect was tested for significance on the group means for total test comprehension and for subtest comprehension.
2. The significance of the interaction between level of reader and treatment given was tested for total test comprehension and for subtest comprehension.

SUMMARY

This chapter has presented descriptions of the population, the sample, the versions of the testing instrument, the pilot study, and the data collection procedures for the main study. The scoring procedures and an outline of the statistical treatment of the data concluded the chapter.

Chapter 4

ANALYSIS OF THE DATA

The purpose of this chapter is to present and discuss the findings of the study. Since the investigation involved the use of an experimental edition of a test of reading comprehension, the RRCT, it was considered advisable to focus some of the analyses on the test itself. Section one of this chapter, therefore, reports upon the reliability coefficients obtained in this administration of the RRCT, both for (a) the total test and (b) the subtests. Section two reports and discusses the findings as they relate specifically to the research questions which guided the study. Section three returns to a critique of the RRCT by exploring in greater detail selected aspects of the syntax subtest of the RRCT.

RELIABILITY FOR THE PRESENT ADMINISTRATION OF THE RRCT

Rystrom originally measured the reliability of the RRCT by correlating performance on the odd and evenly numbered items. He reported reliability coefficients for each of six separate administrations of the test. He then averaged those, and reported a reliability coefficient of .84 (Rystrom, 1970b, p. 150). Tuinman and Blanton (1971b) questioned Rystrom's decision to take the arithmetic mean

of several reliability correlations, which ranged from .70 to .98, yet not to report an overall reliability estimate. They also questioned Rystrom's failure to report reliability coefficients for the six subtests. In the light of these criticisms, it was decided in this investigation (1) to estimate an overall reliability coefficient, and (2) to calculate subtest reliability estimates.

The reliability coefficients reported here are based on the application of the Kuder-Richardson procedure (Guilford, 1965, pp. 458-460). This method for determining reliability ". . . is based on the consistency of subjects' responses to all items in the test" (Anastasi, 1968, p. 84). Kuder-Richardson Formula 20 takes into account all possible ways of subdividing a test and the ". . . reliability coefficient is actually the mean of all split-half coefficients resulting from different splittings of a test" (Anastasi, p. 85).

Table 1 shows the reliability coefficients found for this administration of the RRCT. The overall coefficient of .92 was considered adequate for the purposes of this study and added pertinent information to Rystrom's (1970b) reported reliability coefficients. Some of the difference between Rystrom's overall reliability estimate and the present estimate can be explained statistically. The odd-even approach used by Rystrom for estimating

TABLE 1
RELIABILITY COEFFICIENTS FOR TOTAL
RRCT AND SUBTESTS

Test	Number of Items	Coefficient
Total	57	.92
Vocabulary	7	.30
Syntax	10	.62
Item Recall	14	.68
Item Sequence	19	.87
Interpretation	4	.03
Evaluation	3	.19

reliability is likely to be an underestimate because "it is based on a division of a test in one arbitrary way" (Guilford, 1965, p. 460). This statement is consistent with the higher overall coefficient found for the present administration.

Subtest reliabilities, also reported in Table 1, appear to be consistent with the number of items included in each test, with the smallest subtests, vocabulary, interpretation, and evaluation, showing the poorest coefficients. Although "tests with reliability coefficients as low as .35 have been found useful when utilized in batteries with other tests . . ." (Guilford, 1965, p. 104), it is suggested that the lowest coefficients reported here do limit some of the interpretations of the findings of the present investigation. As well, these coefficients suggest that the subtests of the RRCT need to be examined and lengthened, in an effort to make them more reliable. Rystrom (1970b, p. 148) did suggest that an evident weakness of the RRCT was that the number of items in the interpretation and evaluation subtests was too small, and the present subtest reliabilities lend support to that statement.

RESULTS OF THE ANALYSIS OF THE RESEARCH QUESTIONS

The research questions designed in Chapter 1 were restated as null hypotheses which were tested for

statistical significance by the two way analysis of variance procedure. This statistical procedure was applied to the raw scores for total test comprehension and subtest comprehension on the RRCT. The results are reported in Appendix F.

The major research questions pertained to the mean differences in reading comprehension due to treatment main effect and to the interaction between level of reader and treatment given. Three F values were calculated by each analysis of variance procedure. The F values relating to treatment main effect and interaction are reported as they relate to each research question. The third F values, which relate to the level of reader main effect, are discussed informally in all cases, except for the interpretation subtest.

Null hypotheses I and II dealt with the research questions concerning treatment main effect, while III and IV focussed on the interaction research questions.

Research Question I

Will there be significant differences in the total reading comprehension scores of good and poor fourth grade readers when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by total scores on the Rystrom Reading Comprehension Test?

Null Hypothesis I. There will be no significant difference between picture and no-picture group means for total reading comprehension on the Rystrom Reading Comprehension Test.

Table 2 shows the total comprehension group means for good readers and poor readers under the picture and no-picture conditions.

TABLE 2
GROUP MEANS BASED ON TOTAL
SCORES ON THE RRCT

	Possible Score	Poor Readers (N = 30)	Good Readers (N = 30)
Picture Condition (N = 30)	57	37.60	50.73
No-Picture Condition (N = 30)	57	33.60	49.07

Discussion

As Table 3 reveals, the F value for picture main effect for total reading comprehension on the RRCT was 3.35. This value did not reach the desired level of significance, although it approached significance (.07 level). Null Hypothesis I was not rejected.

The F value for level of reader main effect, shown in Table 3, reveals that there were significant differences in total comprehension means according to level of reader, a finding expected from the original definition and selection of good readers and poor readers.

TABLE 3
SUMMARY OF THE ANALYSIS OF VARIANCE FOR TOTAL
COMPREHENSION ON THE RRCT AS RELATED TO
PICTURE CONDITION AND LEVEL OF READER

Source of Variation	SS	df	MS	F
Pictures (A)	120.38	(A-1)	120.38	3.35
Reader (B)	3067.31	(B-1)	3067.31	85.24**
Interaction (AxB)	20.44	(A-1)x(B-1)	20.44	0.57
Within Groups	2015.13	N _{tot} - (AxB)	35.98	

**Significant beyond .01 level.

Research Question II

Will there be significant differences in the subtest comprehension scores of good and poor fourth grade readers when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by subtest scores on the Rystrom Reading Comprehension Test?

Null Hypothesis II. There will be no significant differences between picture and no-picture group means for subtest comprehension on the Rystrom Reading Comprehension Test.

Table 4 shows the subtest comprehension group means for the six subtests of the RRCT.

Table 5 presents the analysis of variance results for the six subtests.

Discussion

As shown in Table 5, no F values for picture main effect were statistically significant except for the syntax subtest. The vocabulary and evaluation picture main effect F values of 3.20 and 3.32 respectively, approached significance (.07 level), but did not satisfy the .05 level of statistical significance previously set by the investigator. Because there was a statistically significant difference between picture and no-picture group means on the syntax subtest, Null Hypothesis II was partially rejected. Figure 2 presents graphically the syntax group means given in Table 4 and found significant for picture

TABLE 4
GROUP MEANS BASED ON SUBTEST
SCORES ON THE RRCT

	Possible Score	Poor Readers (N = 30)	Good Readers (N = 30)
<u>Vocabulary</u>			
Picture Condition (N = 30)	7	4.27	5.87
No-Picture Condition (N = 30)	7	3.93	5.47
<u>Syntax</u>			
Picture	10	6.27	9.00
No-Picture	10	5.40	8.00
<u>Item Recall</u>			
Picture	14	12.60	13.73
No-Picture	14	11.67	13.67
<u>Item Sequence</u>			
Picture	19	9.40	16.27
No-Picture	19	8.00	16.60
<u>Interpretation</u>			
Picture	4	3.27	3.67
No-Picture	4	3.27	3.33
<u>Evaluation</u>			
Picture	3	1.80	2.20
No-Picture	3	1.33	2.00

TABLE 5
SUMMARY OF THE ANALYSIS OF VARIANCE FOR SUBTEST
COMPREHENSION ON THE RRCT AS RELATED TO
PICTURE CONDITION AND LEVEL OF READER

Source of Variance	SS	df	MS	F
<u>Vocabulary</u>				
Pictures (A)	2.02	1	2.02	3.20
Reader (B)	36.82	1	36.82	58.35**
Interaction (AxB)	.02	1	.02	0.03
Within Groups	35.33	56	.63	
<u>Syntax</u>				
Pictures (A)	13.07	1	13.07	5.13*
Reader (B)	106.67	1	106.67	41.91**
Interaction (AxB)	.07	1	.07	0.03
Within Groups	142.53	56	2.55	
<u>Item Recall</u>				
Pictures (A)	3.75	1	3.75	1.70
Reader (B)	36.82	1	36.82	16.73**
Interaction (AxB)	2.82	1	2.82	1.28
Within Groups	123.20	56	2.20	
<u>Item Sequence</u>				
Pictures (A)	4.27	1	4.27	0.35
Reader (B)	897.07	1	897.07	73.43**
Interaction (AxB)	11.27	1	11.27	0.92
Within Groups	684.14	56	12.22	
<u>Interpretation</u>				
Pictures (A)	.42	1	.42	0.88
Reader (B)	.82	1	.82	1.72
Interaction (AxB)	.42	1	.42	0.88
Within Groups	26.53	56	.47	
<u>Evaluation</u>				
Pictures (A)	1.67	1	1.67	3.32
Reader (B)	4.27	1	4.27	8.49**
Interaction (AxB)	.27	1	.27	0.53
Within Groups	28.13	56	.50	

*Significant at .05 level.

**Significant beyond .01 level.

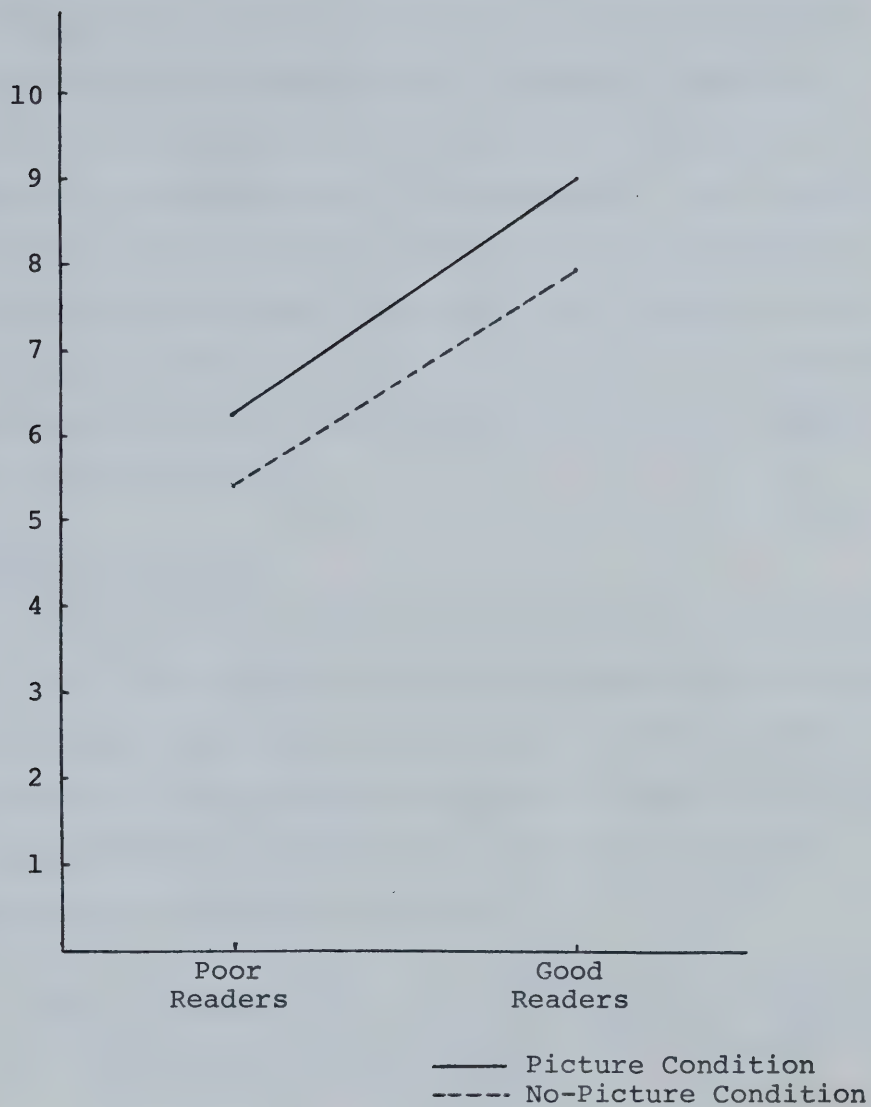


FIGURE 2
GROUP MEANS ON SYNTAX SUBTEST OF RRCT
(10 items)

main effect.

All level of reader main effect F values were statistically significant beyond the .01 level except for the interpretation subtest. The overall level of reader main effect findings indicate that subjects' predefined levels of comprehension were maintained on all present comprehension subtests except interpretation. The nature of the small number of items included in the interpretation subtest may not have allowed for the differentiation of reading comprehension levels. This finding is supported by the low reliability found for this subtest and reported earlier in this chapter.

Research Question III

Will the total reading comprehension scores of good versus poor fourth grade readers be differentially affected when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by total scores on the Rystrom Reading Comprehension Test?

Null Hypothesis III. There will be no interaction between level of reader and treatment given for total reading comprehension on the Rystrom Reading Comprehension Test.

Discussion

As was shown in Table 2, the group mean for good readers in the picture condition was 50.73 and the group

mean for good readers in the no-picture condition was 49.07, a difference of 1.66. Poor readers in the picture condition had a mean of 37.60 and in the no-picture condition a mean of 33.60, a difference of 4.00. As may be seen in Table 3, the F value corresponding to the interaction source of variance was 0.57, and was not significant at the .05 level, indicating that the difference between 1.66 and 4.00 was not statistically significant. Consequently, Null Hypothesis III was not rejected as the influence of pictures on good readers was not significantly different from the influence of pictures on poor readers when total comprehension on the RRCT was measured.

Research Question IV

Will the subtest comprehension scores of good versus poor fourth grade readers be differentially affected when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by subtest scores on the Rystrom Reading Comprehension Test?

Null Hypothesis IV. There will be no interaction between level of reader and treatment given for subtest comprehension on the Rystrom Reading Comprehension Test.

Discussion

Table 4 includes the means pertaining to all

subtests referred to in Null Hypothesis IV. As Table 5 shows, no F values for interaction were significant at the .05 level. Therefore Null Hypothesis IV was not rejected. Good readers and poor readers were influenced in a similar manner when pictures were included with the text of Caps for Sale and when subtest comprehension on the RRCT was measured.

Summary

The research questions examined in this study concerning possible significant differences in the reading comprehension of subjects reading illustrated or unillustrated textual material were not, for the most part, upheld statistically. Of the 14 sets of performance means analyzed in this chapter, 12 sets showed means favouring the picture condition. However, statistical analysis revealed that for only two of those 12 pairs of means, the syntax means, was there a significant difference between the picture and no-picture groups. That the influence of illustrations approached statistical significance for total comprehension and vocabulary and evaluation comprehension warrants further investigation of these particular areas.

The research questions concerning possible differential effects of illustrations on the reading comprehension of good versus poor readers were not upheld by the statistical results. Good readers and poor readers were

not differentially affected, in a statistically significant manner, on any of the aspects of comprehension tested here. This finding suggests that whatever the influence of pictures on reading comprehension, this influence appears to be similar whether readers are classified as good comprehenders or poor comprehenders.

CRITIQUE OF THE RRCT SYNTAX SUBTEST

The only statistically significant picture main effect in this study was found on the syntax subtest of the RRCT. In an attempt to explain the statistical findings concerning this subtest, the syntax questions (see Figure 3) were examined in detail.

The analysis of this subtest revealed that it measured several skills in addition to the understanding of syntactic structures. Question 2.10 was the only "pure" syntax question in that it required the subject to match the meaning of one sentence to its paraphrased counterpart. Two questions (2.1, 2.2) included syntactic change plus recall and two others (2.4, 2.6) involved memory for detail, as well as syntactic and semantic change. Questions 2.5, 2.7, and 2.8 required memory for sequence plus understanding of syntactic and semantic changes. Item 2.9 involved inference and no syntactic change. The remaining syntax question (2.3) will be discussed in the following paragraphs. This analysis shows that the syntax

- 2.1 The peddler in the story was
- an ordinary peddler
 - not an ordinary peddler
 - just another peddler
 - a door to door salesman
- 2.2 An ordinary peddler carries his wares
- on his head
 - in his car
 - on his horse
 - on his back
- 2.3 he held himself straight means
- he held the caps straight
 - he stood straight
 - his caps were straight
 - he walked in a straight line
- 2.4 The peddler held himself straight because
- his back hurt
 - his mother told him to
 - he was refreshed and rested
 - he didn't want to drop any caps
- 2.5 The peddler sat down under a tree. Next he
- leaned back
 - went to sleep
 - saw the monkeys
 - became angry
- 2.6 The peddler leaned back against the tree carefully because
- he didn't want to hurt his head
 - he didn't want to knock off his caps
 - he was tired
 - he saw the monkeys in the tree
- 2.7 After the peddler sat down he
- fell asleep immediately
 - said "Hello" to the monkeys
 - lit his pipe
 - made sure his caps were straight
- 2.8 When he woke up the peddler
- reached for his caps
 - reached for his checked cap
 - reached for the monkeys
 - opened his eyes and went back to sleep
- 2.9 The peddler said "You monkeys, you" because
- he didn't remember their names
 - he was angry
 - he was sleepy
 - he was hungry
- 2.10 Give me back my caps is the same as
- give me those caps
 - put the caps on my back
 - give back my caps to me
 - give my back a tap

FIGURE 3

SYNTAX QUESTIONS FROM THE RRCT

results were confounded by the types of questions included within this subtest. However, the reliability of the syntax subtest (see Table 1) indicated that subjects responded as consistently here as they had on other subtests of similar length. Table 6 indicates the overall superiority of the picture groups over the no-picture groups but shows no discernible response tendencies concerning the types of questions asked.

The foregoing analysis of this subtest shows that it should not be considered a valid test of syntactic comprehension. Although subjects' responses on this subtest were fairly consistent (see Table 1), it is difficult to ascertain just what type of skill was being measured. Several of the existing questions might be relabelled and included within other subtests on the RRCT. For instance, questions 2.5, 2.7, and 2.8 might be added to the item sequence subtest. Several other alterations might be made to the present questions but basically this subtest needs to be examined and the questions redesigned.

In a further attempt to account for the syntax subtest statistical findings, the investigator utilized the data in Appendix G. This appendix shows the sources of information considered available to subjects answering the RRCT questions. During May, 1975, the investigator submitted the illustrated book and the comprehension test to four graduate students. They read the book, answered

TABLE 6
PERCENTAGE OF CORRECT RESPONSES ON SYNTAX SUBTEST OF THE RRCT

Group	Questions									
	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10
Good Pictures	80	67	100	93	87	93	100	100	100	73
Good No Pictures	60	53	80	100	60	100	93	93	100	60
Poor Pictures	73	27	60	100	40	93	27	87	87	33
Poor No Pictures	27	13	40	87	60	80	33	73	93	33
Average	60	40	70	95	62	92	63	88	95	50

each question on the comprehension test, and were then given a chart listing the various information sources considered available to subjects taking the test. These sources of information were considered to be: text alone, picture or pictures alone, text and picture(s) combined, and general knowledge possessed by the reader. The raters were instructed to check the primary source of information used by them to answer each question as well as to indicate any secondary sources they considered important. Concerning the sources of information presumed available for syntax comprehension on the RRCT, there was rater agreement on nine of the ten syntax questions. On only one (2.8) of these nine questions did all raters choose pictures as a possible source of information. For this question pictures were considered to be a source of information along with the text. No raters chose pictures as information sources for the remaining eight questions. Concerning the question (2.3) over which rater disagreement occurred, one rater included pictures along with general knowledge as the sources of information considered important. Another rater chose general knowledge alone and the other two chose general knowledge in conjunction with the text of the book. Question 2.3 contains the idiomatic expression "he held himself straight," an English usage difficult to analyze in terms of possible avenues of information leading to meaning. Pictures appeared to make

the meaning of this syntactic construction clearer to the subjects in this study.

As evidenced by rater choices, there was no clear indication as to why pictures significantly affected performance on the syntax subtest. Pictures may have collectively added to subjects' understanding of the meanings of the syntactic structures tested on this subtest. They could have alerted subjects to certain meaningful details included within the text and portrayed in the pictures. Or pictures may have given enough emphasis to certain events that these could be recalled more readily by subjects answering the syntax questions. This finding merits continued investigation.

SUMMARY

This chapter presented total test and subtest reliabilities for the present administration of the RRCT. It also dealt with the analysis and interpretation of the findings of this study. Four research questions were asked and the corresponding null hypotheses tested for statistical significance. Although there were superior picture group means on six of the seven comprehension measures tested here and the F values for three of these six measures did approach statistical significance, only syntax comprehension was significantly higher for subjects in the picture groups. Present findings suggested that

illustrations do not differ statistically in their influence upon the reading comprehension of good readers and poor readers reading the same illustrated textual material.

Chapter 5

SUMMARY AND CONCLUSIONS

The purpose of this study was to investigate the differences, if any, in children's reading comprehension of textual material when illustrations were included with that material and when they were not. Another concern was to determine if illustrations differentially influenced the reading comprehension of good readers and poor readers reading the same textual material. By reading comprehension was meant total scores and subtest scores on the Rystrom Reading Comprehension Test (RRCT).

In order to accomplish these objectives, two treatments were administered. One-half of the subjects read an illustrated story and then completed the RRCT. The other subjects read an unillustrated version of the same story and completed the RRCT. Subjects were divided into good readers and poor readers on the basis of prior reading comprehension performance and were assigned to one of the treatments.

SAMPLE

Subjects were chosen from 13 grade four classrooms in the Edmonton Public School System. They were selected according to percentile rank on the paragraph meaning

subtest of the Stanford Achievement Test, as this was the most readily available measure of reading comprehension. Good readers were children ranking at or above the 75th percentile on the 1974 Edmonton norms for the above subtest while poor readers were those who ranked at or below the 25th percentile. Thirty good readers and 30 poor readers were randomly selected, from 59 good and 70 poor readers, to participate in this investigation and 15 subjects from each group were randomly chosen to be in the picture condition. The remaining subjects received the no-picture treatment. Grade four was chosen, in part, because Read (1950) had revealed that the use of pictures in elementary reading textbooks gradually diminished as grade level increased. The present study might redirect that trend if it were shown that the reading comprehension of children in grade four was higher when illustrations were included with textual material.

THE TESTING INSTRUMENT

Reading Material

The 1970 paperback edition of the children's story-book Caps for Sale by Esphyr Slobodkina was used as the reading material for the picture condition of this study. The no-picture version was prepared by photocopying the textual pages of the paperback edition and stapling them into booklet form. This booklet was identical to the

paperback in format and size except for the exclusion of the illustrations.

Caps for Sale was used for several reasons. First, it was an existing children's storybook, told and illustrated by the author, and not designed for the present study. The illustrations were an integral part of the book's format and their use here prevented whatever bias might have resulted from experimenter selection and/or design. Second, because this study was concerned with reading comprehension, it was important that the reading material selected be simple enough so that word recognition would not unnecessarily limit subjects' reading comprehension. Caps for Sale appeared to satisfy this condition as the reading difficulty level calculated for this text was approximately mid-grade two. Another reason for choosing Caps for Sale was that the comprehension instrument used here, the Rystrom Reading Comprehension Test, was developed expressly to measure the reading comprehension of this story.

Test Questions

The comprehension instrument used in this study was the experimental edition of the Rystrom Reading Comprehension Test devised by Richard Rystrom in 1969. It was designed to suggest and test a teaching model of comprehension and was composed of six defined aspects of reading comprehension. The RRCT contains 57 multiple-choice

comprehension questions: 7 deal with vocabulary, 10 with syntax, 14 with item recall, 19 with item sequence, 4 with interpretation, and 3 with evaluation. In 1970, Rystrom reported an odd-even reliability estimate of .84 and a concurrent validity of .86 for this test.

TREATMENT PROCEDURES

An attempt was made to follow as many of Rystrom's 1969 procedures as was possible. Subjects were given assistance with the pronunciation of any unknown words from either the book or the comprehension test. They had unlimited time to read the book and answer the questions. Whereas Rystrom's subjects read only a specially prepared version of the book minus illustrations, subjects in this study read either of the two story formats previously outlined. Subjects were tested individually in empty rooms within the four schools involved.

A pilot study was conducted in April, 1975, to ascertain the acceptability of the treatment procedures. Subjects in the picture condition seemed to attend to the pictures even though they were not specifically directed to do so. For this reason, and because of Koenke's (1968) findings of non-significance concerning the extent and type of directions given to subjects, it was decided to give a single set of directions to all subjects. Since all subjects in the pilot study followed the directions

adequately, all pilot study procedures were carried over to the main study.

The main study was carried out during April and May, 1975. All subjects completed the RRCT after reading the appropriate version of the story. If a subject had previously read or was familiar with the story, he or she was eliminated and another subject randomly chosen for the appropriate group.

FINDINGS

Two statistical procedures were used to analyze the data in this study. The Kuder-Richardson procedure for estimating reliability estimated the overall test reliability and subtest reliabilities for this administration. The two way analysis of variance procedure dealt with the research questions designed in Chapter 1, which were restated as null hypotheses and tested for statistical significance.

Research Question I

Will there be significant differences in the total reading comprehension scores of good and poor fourth grade readers when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by total scores on the Rystrom Reading Comprehension Test?

Research Question II

Will there be significant differences in the subtest comprehension scores of good and poor fourth grade readers when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by subtest scores on the Rystrom Reading Comprehension Test?

Research Question III

Will the total reading comprehension scores of good versus poor fourth grade readers be differentially affected when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by total scores on the Rystrom Reading Comprehension Test?

Research Question IV

Will the subtest comprehension scores of good versus poor fourth grade readers be differentially affected when they read the illustrated or unillustrated version of the children's storybook Caps for Sale by Esphyr Slobodkina, when comprehension is measured by subtest scores on the Rystrom Reading Comprehension Test?

The findings from the study were as follows:

1. The overall test reliability was estimated as .92. Subtest reliabilities ranged from .87 to .03 and were consistent with the number of items in each subtest,

the smallest subtests showing the poorest coefficients.

2. There were no statistically significant differences in subjects' total comprehension of reading material when pictures were included with that material. Nor were there significant differences in comprehension on the vocabulary, item recall, item sequence, interpretation, and evaluation subtests when pictures were present. The difference between performance means did approach statistical significance for total comprehension and for vocabulary and evaluation comprehension.

3. Pictures did make a statistically significant difference in the comprehension of the syntax subtest. The means of the picture groups were significantly higher than the means of the no-picture groups on this subtest.

4. Good readers and poor readers were similarly affected by pictures whether total comprehension or subtest comprehension, on the RRCT, was measured.

LIMITATIONS

With any research study, there are certain inherent limitations arising from its experimental nature. So that conclusions from this study will appear in proper perspective, certain limitations beyond those given in Chapter 1 need to be noted.

1. Although a high overall reliability coefficient was found for this administration of the RRCT, one

consistent with that reported by Rystrom, several subtest reliabilities, notably interpretation and evaluation, were less than desirable. This should be considered when the results of the investigation are discussed.

2. Another cautionary dimension concerns the validity of the items within each subtest. Does each item, in fact, measure what it purports to measure? Detailed analysis of the syntax subtest revealed several components in addition to the measurement of syntax. Although Rystrom did report a high correlation with another reading achievement test, this coefficient was based on global comprehension skills and not on subtest performance. The experimental edition of the RRCT will require further validation and refinement concerning subtest measurement.

3. Because of the multiple-choice nature of the test questions, answers were limited in scope. This may have particularly affected the interpretation and evaluation subtests where the intent of the questions was that the subject look for answers beyond the information given. By forcing the subject to choose among given alternatives, this format may have inhibited or altered his responses.

4. It was impossible to tell how each subject in the picture condition used the pictures. Was the subject looking for information additional to the text? Did the subject expect to learn anything from the pictures? Because a subject's background use of pictures in reading

material could not be known, it was not clear how he perceived the experimental situation.

Considering these limitations, plus the factors outlined in Chapter 1, it would be wise to exercise caution when generalizing from this study. Only when similar testing conditions and instruments are used could one reasonably expect to achieve similar results. Generalizations applicable to the elementary classroom need to be cautiously formulated until further investigations and improvements are made.

CONCLUSIONS AND DISCUSSION

The results of this study tended to corroborate the findings of Miller (1938), Vernon (1953, 1954), Koenke (1968), and Pederson (1970), that pictures included with textual material do not significantly enhance a subject's comprehension of that material. Present results more fully confirmed Pederson's findings that most aspects of literal and inferential comprehension, when measured by a multiple-choice test, were not influenced significantly by the presence of pictures in reading material. This study did however offer an additional finding. Comprehension on the syntax subtest of the RRCT was significantly affected when pictures accompanied textual material. This finding suggests the need for further investigation into the nature of this influence.

Although the reading comprehension of good readers (Weintraub, 1960) and poor readers (Pederson, 1970) had been investigated separately, not until Bluth (1972) was the comparative comprehension of good readers and poor readers, reading the same textual material, investigated. No interaction between reader level and picture condition was found in the present study whereas Bluth found that good readers comprehended significantly better when pictures were present. Because Bluth used the cloze technique for measuring comprehension it may be that this measure differs enough from the multiple-choice format used here that direct comparison cannot be made. This suggests an area worthy of investigation. Another reason for the discrepant findings may be found in the differing definitions of good readers and poor readers. Bluth chose readers from the top three and bottom three stanines on the California Achievement Test. The present subjects covered a wider range of ability in both categories. Low readers in Bluth's study may have been so hampered by word recognition difficulties and/or failure to understand the task that they may have been unnecessarily penalized. The present study indicated that if poor readers were given assistance with the pronunciation of words, understood the given task, and answered a multiple-choice test, they were influenced by pictures no differently than were good readers.

One of the concerns of this study was that the trend toward the continual decline in the use of illustrations in basal readers as grade level increases might hinder the reading comprehension of upper elementary students. This study has not borne out the assumption made by the investigator that pictures might benefit the reading comprehension of some children in grade four. However, because picture influence approached significance in several areas, most notably with total reading comprehension, the suggestion that pictures may play a pedagogical role in children's comprehension of reading material is made. Considering this influence, it would be premature to advocate the removal of illustrations from children's reading materials.

This study indicated that both good readers and poor readers in grade four were affected by adjunctive illustrations similarly enough that educators need not necessarily treat children differently regarding that type of illustration. It could be argued, though, that because the illustrations used in this study acted as adjuncts to the text, they offered so little added information to the text that possible reader differences could not arise. Most previous research studies in this area, save for Goodykoontz' (1936), have dealt with pictures used as adjuncts. Another profitable area for further investigation would be the examination of the effects

which non-adjunctive illustrations might have on children's reading comprehension.

Building on Koenke's (1968) report that direction to view the included pictures presented no statistically significant advantage to the reader, the present administration employed no such direction. Present subjects did notice the pictures even if they glanced very quickly at them while focussing their main attention on the text. If the accompanying illustrations had not been used as adjuncts, subjects' comprehension might have been more influenced by direction to view the illustrations, as was suggested by the Goodykoontz' (1936) experiment.

This study did not focus on picture style or format but used the illustrations as they were found in the reading material. Bloomer (1960) made some suggestions regarding children's preferences in pictures but did not look at picture preference and reading comprehension per se. This type of interaction merits further investigation.

In conclusion, then, this investigation did not offer strong statistical support for the positive influence of pictures on children's reading comprehension. It did suggest an effect approaching significance for total measured comprehension, vocabulary comprehension, and evaluation comprehension. Syntax comprehension was significantly higher when pictures were included with the reading material. As to the expense incurred by publishers

of children's reading materials, who generally include illustrations with the texts, this study does not provide firm direction regarding that practice. It suggests that pictures can influence reading comprehension and points to a significant influence in one comprehension area. Rather than providing conclusive evidence regarding the issue, this study pinpoints further areas needing exploration and adds new knowledge to the topic of the influences of illustrations on children's reading comprehension.

RECOMMENDATIONS FOR FURTHER RESEARCH

Research studies tend to raise more questions than they answer and this study was no exception. The following suggestions are made regarding further areas for investigation:

1. If the RRCT is to be used again experimentally, it is suggested that the smaller subtests be examined and enlarged in an effort to improve the reliabilities of these measures. As well, a complete item analysis should be carried out, to be followed by a cross validation with a new sample in an effort to develop item validity.

2. Because this study found that syntactic comprehension, as measured by the RRCT, was significantly influenced by pictures, further detailed analysis of this influence needs to be explored. The present syntax

subtest should be refined and expanded so that syntactic skills are separated from certain memory and semantic components, or a more appropriate test of syntax might be designed.

3. The present study could be replicated at another grade level, possibly grade two. This might give evidence that poor readers reading material beyond their attained grade level were substantially influenced or assisted by pictures in certain areas of reading comprehension.

4. This study could be replicated at the grade four level with the addition of a cloze measure of comprehension, presented with and without the present illustrations. The comparison of comprehension measures might yield significant information regarding the nature of the two instruments and might add further knowledge to the findings of Bluth (1972).

5. Another study might use non-adjunctive illustrations and test the present areas of reading comprehension. Test sections would include questions which could be answered from the text or the included illustrations. One group could be directed to view the pictures and another group not so instructed. This could give direction to the producers of children's reading materials concerning the various functions and influences which illustrations can have.

6. A teaching experiment could be conducted in which children were taught to "read" different types of pictures. A test measuring the six aspects of comprehension dealt with here could be constructed. If pictures could be designed to focus on these six areas, a comparison could be made of the reading comprehension of children taught to use pictures for informational purposes and those not taught such skills.

7. Various picture formats and styles could be developed and their influences on specific aspects of comprehension could be investigated. This might give insight to the illustrators and publishers of children's reading materials.

8. This study did not deal with the motivational effects of pictures on children. Is children's reading comprehension enhanced because of a motivational aspect which illustrations provide? Further work could be undertaken in this area.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Anastasi, Anne. Psychological Testing. New York: The Macmillan Company, 1968.
- Bloomer, Richard H. "Children's Preferences and Responses as Related to Styles and Themes of Illustration," The Elementary School Journal, LX (1960), 334-340.
- Bloomfield, Leonard, and Clarence L. Barnhart. Let's Read * A Linguistic Approach *. Detroit: Wayne State University Press, 1961.
- Bluth, Linda Fran. "A Comparison of the Reading Comprehension of Good and Poor Readers in the Second Grade With and Without Illustrations." (Doctoral Dissertation, University of Illinois, 1972). Eric ED 082 175.
- Campbell, Donald T., and Julian C. Stanley. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally and Company, 1967.
- Campbell, William Giles, and Stephen Vaughan Ballou. Form and Style: Theses, Reports, Term Papers. Boston: Houghton Mifflin Company, 1974.
- Chall, Jeanne S. Learning to Read: The Great Debate. New York: McGraw-Hill Book Company, 1967.
- Davis, Frederick B. "Research in Comprehension in Reading," Reading Research Quarterly, III (1968), 499-545.
- Ferguson, George A. Statistical Analysis in Psychology and Education. New York: McGraw-Hill Book Company, 1971.
- Fries, Charles C., and others. The Merrill Linguistic Reading Program. Columbus, Ohio: Charles E. Merrill Publishing Co., 1966.
- Fry, Edward. "A Readability Formula that Saves Time," Journal of Reading, XI (1968), 513-516.
- Goodykoontz, Bess. "The Relation of Pictures to Reading Comprehension," The Elementary English Review, XIII (1936), 125-130.
- Guilford, J. P. Fundamental Statistics in Psychology and Education. New York: McGraw-Hill Book Company, 1965.

- Halbert, Marie Goodwin. "The Teaching Value of Illustrated Books," The American School Board Journal, CVIII (1944), 43-44.
- Hanes, Michael I. "The Research on How Children Learn from Pictures," Viewpoints, XLIX (1973), 11-20.
- Kelley, Truman L., and others. Stanford Achievement Test Primary II Battery. New York: Harcourt, Brace and World, Inc., 1964.
- Koenke, Karl Richard. "The Effects of a Content Relevant Picture on the Comprehension of the Main Idea of a Paragraph." (Doctoral Dissertation, University of Wisconsin.) Ann Arbor, Michigan: University Microfilms, 1968, No. 68-7109.
- Koenke, Karl, and Wayne Otto. "Contribution of Pictures to Children's Comprehension of the Main Idea in Reading," Psychology in the Schools, VI (1969), 298-302.
- Levie, W. Howard. "Pictorial Research: An Overview," Viewpoints, XLIX (1973), 37-45.
- Miller, William A. "Reading With and Without Pictures," The Elementary School Journal, XXXVIII (1938), 676-682.
- Neale, John M., and Robert M. Liebert. Science and Behavior: An Introduction to Methods of Research. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1973.
- Otto, Wayne, and others. "Summary and Review of Investigations Relating to Reading July 1, 1969 to June 30, 1970," The Journal of Educational Research, LXIV (1971), 242-268.
- Pederson, Diane Louise. "The Effect of Pictures on Primary Grade Children's Comprehension of Basal Readers." (Doctoral Dissertation, University of Minnesota.) Ann Arbor, Michigan: University Microfilms, 1971, No. 71-18,875.
- Read, John G. "Picture Indices for Basic Readers," The Elementary School Journal, L (1950), 339-340.
- Rystrom, Richard. "Toward Defining Comprehension: A First Report," Journal of Reading Behaviour, II (1970), 56-74. (a)
- Rystrom, Richard. "Toward Defining Comprehension: A Second Report," Journal of Reading Behaviour, II (1970), 144-157. (b)

- Rystrom, Richard. "A Reply to the Tuinman/Blanton Commentary," Journal of Reading Behaviour, III (1971), 64-69.
- Samuels, S. Jay. "Effects of Pictures on Learning to Read, Comprehension and Attitudes," Review of Educational Research, XL (1970), 397-407.
- Simons, Herbert D. "Reading Comprehension: The Need for a New Perspective," Reading Research Quarterly, VI (1971), 338-363.
- Slobodkina, Esphyr. Caps for Sale: A Tale of a Peddler, Some Monkeys, and Their Monkey Business. New York: W. R. Scott, 1947.
- Slobodkina, Esphyr. Caps for Sale: A Tale of a Peddler, Some Monkeys, and Their Monkey Business. New York: Scholastic Book Services, 1970.
- Spache, George D. Good Reading for Poor Readers. Champaign, Illinois: Garrard Publishing Company, 1974.
- Spaulding, Seth. "Research on Pictorial Illustration," Audio-Visual Communication Review, III (1955), 35-45.
- Spence, Janet T., and others. Elementary Statistics. New York: Appleton-Century-Crofts, 1968.
- Tuinman, J. Jaap, and B. Elgit Blanton. "Toward Defining Comprehension? A Brief Commentary on Rystrom's Approach," Journal of Reading Behaviour, III (1971), 60-63. (a)
- Tuinman, J. Jaap, and B. Elgit Blanton. "Rystrom's Model—For the Last Time," Journal of Reading Behaviour, III (1971), 47-51. (b)
- Vernon, Magdalen D. "The Value of Pictorial Illustration," The British Journal of Educational Psychology, XXIII (1953), 180-187.
- Vernon, M. D. "The Instruction of Children by Pictorial Illustration," The British Journal of Educational Psychology, XXIV (1954), 171-179.
- Weintraub, Sam. "The Effect of Pictures on the Comprehension of a Second Grade Basal Reader." (Doctoral Dissertation, University of Illinois.) Ann Arbor, Michigan: University Microfilms, 1960, No. 60-4016.

Weintraub, Samuel. "Illustrations for Beginning Reading,"
The Reading Teacher, XX (1966), 61-67.

Winer, B. J. Statistical Principles in Experimental
Design. New York: McGraw-Hill Book Company, 1971.

APPENDICES

APPENDIX A
RYSTROM'S STORY FORMAT
OCTOBER 1969

EsphyrSlobodkina. Caps for Sale. New York: William R. Scott,

Inc. 1947.

Once there was a peddler who sold caps. But he was not like an ordinary peddler carrying his wares on his back. He carried them on top of his head.

First he had on his own checked cap, then a bunch of gray caps, then a bunch of brown caps, then a bunch of blue caps, and on the very top a bunch of red caps.

He walked up and down the streets, holding himself very straight so as not to upset his caps.

As he went along he called, "Caps! Caps for sale! Fifty cents a cap".

One morning he couldn't sell any caps. He walked up the street and he walked down the street calling, "Caps! Caps for sale. Fifty cents a cap."

But nobody wanted any caps that morning. Nobody wanted even a red cap.

He began to feel very hungry, but he had no money for lunch.

"I think I'll go for a walk in the country," said he. And he walked out of town - - slowly, slowly, so as not to upset his caps.

He walked for a long time until he came to a great big tree.

"That's a nice place for a rest," thought he.

And he sat down very slowly, under the tree and leaned back little by little against the tree-trunk so as not to disturb the caps on his head.

Then he put up his hand to feel if they were straight - - first his own checked cap, then the gray caps, then the brown caps, then the blue caps, then the red caps on the very top.

They were all there.

So he went to sleep.

He slept for a long time.

When he woke up he was refreshed and rested.

But before standing up he felt with his hand to make sure his caps were in the right place.

All he felt was his own checked cap!

He looked to the right of him. No caps.

He looked to the left of him. No caps.

He looked in back of him. No caps.

He looked behind the tree. No caps.

Then he looked up into the tree.

And what do you think he saw?

On every branch sat a monkey. On every monkey was a gray, or a brown, or a blue, or a red cap!

The peddler looked at the monkeys.

The monkeys looked at the peddler.

He didn't know what to do.

Finally he spoke to them.

"You monkeys, you," he said, shaking a finger at them, "you give me back my caps."

But the monkeys only shook their fingers back at him and said, "Tsz, tsz, tsz."

This made the peddler angry, so he shook both hands at them and said, "You monkeys, you! You give me back my caps."

But the monkeys only shook both their hands back at him and said, "Tsz, tsz, tsz."

Now he felt quite angry. He stamped his foot, and he said,
"You monkeys you! You better give me back my caps!"

But the monkeys only stamped their feet back at him and said,
"Tsz, tsz, tsz."

By this time the peddler was really very, very angry. He stamped both his feet and shouted, "You monkeys, you! You must give me back my caps!"

But the monkeys only stamped both their feet back at him, and said, "Tsz, tsz, tsz."

At last he became so angry that he pulled off his own cap, threw it on the ground, and began to walk away.

But then, each monkey pulled off his cap . . .

and all the gray caps,

and all the brown caps,

and all the blue caps,

and all the red caps came flying down out of the tree.

So the peddler picked up his caps and put them back on his head - -

first his own checked cap,

then the gray caps,

then the brown caps,

then the blue caps,

then the red caps on the very top.

And slowly, slowly, he walked back to town calling, "Caps!
Caps for sale! Fifty cents a cap."

APPENDIX B

RYSTROM READING COMPREHENSION TEST

AND ANSWER KEY

NAME

TEACHER

SCHOOL

GROUP

_____/57

RYSTROM READING COMPREHENSION TEST

(Experimental Edition)

September, 1969

The University of Georgia

Underline the best answer.

- 1.1 A peddler is
- a. a toy for children
 - b. a man who sells things
 - c. a kind of clothing
 - d. a man who builds houses
- 1.2 An ordinary peddler is
- a. like everyone else
 - b. not like other peddlers
 - c. like other peddlers
 - d. riding a bicycle
- 1.3 The Wares are the
- a. caps
 - b. food
 - c. animals
 - d. children
- 1.4 A checked cap is
- a. all one color
 - b. different colors in squares
 - c. different colors in rows
 - d. different colors in circles
- 1.5 A bunch of caps is
- a. a headache
 - b. many caps
 - c. one cap
 - d. two caps

- 1.6 The peddler was refreshed. He was
- a. rested again
 - b. tired
 - c. just the same
 - d. thirsty
- 1.7 In the story upset means to
- a. make angry
 - b. tear
 - c. get dirty
 - d. scatter around
- 2.1 The peddler in the story was
- a. an ordinary peddler
 - b. not an ordinary peddler
 - c. just another peddler
 - d. a door to door salesman
- 2.2 An ordinary peddler carries his wares
- a. on his head
 - b. in his car
 - c. on his horse
 - d. on his back
- 2.3 he held himself straight means
- a. he held the caps straight
 - b. he stood straight
 - c. his caps were straight
 - d. he walked in a straight line

- 2.4 The peddler held himself straight because
- a. his back hurt
 - b. his mother told him to
 - c. he was refreshed and rested
 - d. he didn't want to drop any caps
- 2.5 The peddler sat down under a tree. Next he
- a. leaned back
 - b. went to sleep
 - c. saw the monkeys
 - d. became angry
- 2.6 The peddler leaned back against the tree carefully because
- a. he didn't want to hurt his head
 - b. he didn't want to knock off his caps
 - c. he was tired
 - d. he saw the monkeys in the tree
- 2.7 After the peddler sat down he
- a. fell asleep immediately
 - b. said "Hello" to the monkeys
 - c. lit his pipe
 - d. made sure his caps were straight
- 2.8 When he woke up the peddler
- a. reached for his caps
 - b. reached for his checked cap
 - c. reached for the monkeys
 - d. opened his eyes and went back to sleep

- 2.9 The peddler said "You monkeys, you" because
- a. he didn't remember their names
 - b. he was angry
 - c. he was sleepy
 - d. he was hungry
- 2.10 Give me back my caps is the same as
- a. give me those caps
 - b. put the caps on my back
 - c. give back my caps to me
 - d. give my back a tap
- 3.1 What did the peddler sell?
- a. pots and pans
 - b. caps
 - c. toys
- 3.2 Where did the peddler carry his wares?
- a. in a wagon
 - b. on his back
 - c. on his head
- 3.3 Did the peddler have a cap of his own?
- a. Yes, a cap just like the ones he sold.
 - b. No, he did not have a cap of his own.
 - c. Yes, a cap not like the ones he sold.
- 3.4 The peddler sold caps that were
- a. different colors
 - b. different shapes
 - c. all one color

- 3.5 How did the peddler carry his caps?
- a. stacked on his arm in a special order
 - b. stacked on his head in a special order
 - c. stacked on his head in no-special order
- 3.6 How much did each cap cost?
- a. \$1.00
 - b. 50¢
 - c. 10¢
- 3.7 Why did the peddler walk in the country?
- a. because he could not sell any caps
 - b. because he sold all his caps
 - c. because he wanted to see the monkeys
- 3.8 What did the peddler do in the country?
- a. he played a game with some children
 - b. he went to sleep under a tree
 - c. he ate his lunch under a tree
- 3.9 What happened to the peddler's caps?
- a. some monkeys took them
 - b. some children took them
 - c. the wind blew them away
- 3.10 When the peddler saw his caps were gone he
- a. went back to sleep
 - b. walked back to town without his caps
 - c. tried to get his caps back

- 3.11 What did the monkeys do?
- a. they copied everything the peddler did
 - b. they ran away from him
 - c. they just looked at him
- 3.12 How did the peddler feel when he couldn't get his caps back?
- a. happy
 - b. sad
 - c. angry
- 3.13 What did the peddler do just before he got his caps back?
- a. he climbed up the tree to get his caps back
 - b. he threw his own cap on the ground
 - c. he sat down and cried
- 3.14 What did the peddler do after he got the caps back?
- a. he chased the monkeys
 - b. he threw the caps at the monkeys
 - c. he put the caps on his head and walked back to town

Fill in the blanks.

Group A Sentences

These sentences from the story are mixed up. Write a 1 on the line next to the sentence that should be first; write a 2 on the line next to the sentence that should be second; write a 3 on the line next to the sentence that should be third.

- _____ 1. The peddler went to sleep for a long time.
- _____ 2. He felt the caps on his head to see if they were straight.
- _____ 3. He sat down under the tree to rest.

Group B Sentences

These sentences from the story are mixed up. Write a 1 on the line next to the sentence that should be first; write a 2 on the line next to the sentence that should be second; write a 3 on the line next to the sentence that should be third.

- _____ 4. The peddler walked up and down the streets of the town one morning trying to sell his caps.
- _____ 5. No one bought any caps so he went for a walk in the country.
- _____ 6. He arranges the caps he sells in a special order on his head.

Fill in the blanks.

Group C Sentences

These sentences from the story are mixed up. Write a 1 on the line next to the sentence that should be first; write a 2 on the line next to the sentence that should be second; write a 3 on the line next to the sentence that should be third; write a 4 on the line next to the sentence that should be fourth.

- _____ 7. The peddler walked back to town to sell his caps.
_____ 8. He picked up the caps and put them back on his head.
_____ 9. The monkeys copied him and threw their caps on the ground.
_____ 10. He finally threw his cap on the ground and began to walk away.

Group D Sentences

These sentences from the story are mixed up. Write a 1 on the line next to the sentence that should be first; write a 2 on the line next to the sentence that should be second; write a 3 on the line next to the sentence that should be third; write a 4 on the line next to the sentence that should be fourth.

- _____ 11. The peddler looked up in the tree and saw some monkeys
with his caps.
_____ 12. When he woke up, he felt to make sure his caps were straight.
_____ 13. The caps were gone so he looked all around for them.
_____ 14. The monkeys copied everything the peddler did.
_____ 15. He did many things to try to get his caps back.

Underline the best answer.

4.16 Look at Group A, Group B, Group C, and Group D on pages 7 and 8.

Which group came first in the story?

Group A Group B Group C Group D

4.17 Which group came second in the story?

Group A Group B Group C Group D

4.18 Which group came third in the story?

Group A Group B Group C Group D

4.19 Which group came fourth in the story?

Group A Group B Group C Group D

5.1 Why does the peddler carry his wares on his head?

- a. so people will see them
- b. so his back won't get tired
- c. so he can bend over

5.2 Why does the peddler call out "Caps for sale."?

- a. so people will hear and buy a cap
- b. so the monkeys know he is coming
- c. because he likes to

5.3 Why does the peddler put on his own cap first?

- a. because he wants to
- b. because the monkeys didn't take it
- c. because it isn't for sale

5.4 What color caps are the most popular?

- a. blue
- b. brown
- c. red

- 6.1 This story is probably a
- a. a true story
 - b. sad story
 - c. make-believe story
- 6.2 The peddler goes for a walk in the country
- a. because he is hungry
 - b. because he wants to sleep
 - c. because the monkeys are there
- 6.3 The monkeys did not take any
- a. red caps
 - b. checked cap
 - c. yellow cap

RYSTROM READING COMPREHENSION TEST

Answer Key

PAGE 1

1.1 b
1.2 c
1.3 a
1.4 b
1.5 b

PAGE 2

1.6 a
1.7 d
2.1 b
2.2 d
2.3 b

PAGE 3

2.4 d
2.5 a
2.6 b
2.7 d
2.8 a

PAGE 4

2.9 b
2.10 c
3.1 b
3.2 c
3.3 c
3.4 a

PAGE 5

3.5 b
3.6 b
3.7 a
3.8 b
3.9 a
3.10 c

PAGE 6

3.11 a
3.12 c
3.13 b
3.14 c

PAGE 7

Group A
1. 3
2. 2
3. 1
Group B

4. 2
5. 3
6. 1

PAGE 8

Group C
7. 4
8. 3
9. 2
10. 1

Group D

11. 3
12. 1
13. 2
14. 5
15. 4

PAGE 9

4.16 Group B
4.17 Group A
4.18 Group D
4.19 Group C
5.1 a
5.2 a
5.3 c
5.4 c

PAGE 10

6.1 c
6.2 a
6.3 b

APPENDIX C
TESTING PROCEDURE FOR PILOT STUDY
AND MAIN STUDY

TESTING PROCEDURE FOR PILOT STUDY AND MAIN STUDY

Hello, my name is _____.

What's your name?

I'm interested in finding out how well children in grade four can answer questions about a story they have just finished reading.

In a minute I'm going to give you a storybook to read. I want you to read the whole book silently. If you come to any word you don't know while you are reading the story ask me and I will tell you the word.

(Show subject the book.)

Here is the book. Have you read this story before?

(Eliminate subject if he or she is familiar with story or has read the book.)

Remember to ask me about any words you can't read. Go ahead.

(After subject has finished reading the book, take it and cover it.)

Good, thank you.

(Ask subject again if he had read the book before. Eliminate him if he now recalls reading it.)

(Show subject the test on which his name has been printed.)

Now I want you to answer some questions about the story you have just read. Read each question carefully. There will be several possible answers for each question.

You are to pick the one answer that is best and underline it with a pencil. If you don't understand how to do any of the questions ask me. Also if you can't read any of the words in the questions ask me and I will tell you. Go ahead with the questions.

Thanks very much for helping me.

APPENDIX D

SUBJECTS' TEST COMPLETION TIMES
AND WORDS REQUESTED

SUBJECTS' TEST COMPLETION TIMES AND WORDS REQUESTED

Identification Number	Group	Time Taken (in minutes)			Words Requested by Subjects	
		Book	Test	Total	Book	Test
1	HP	6	14	20	no words	no words
2	HP	4	11	15	no words	no words
3	HP	4	14	18	no words	no words
4	HP	4	12	16	no words	no words
5	HP	5	13	18	no words	no words
6	HP	5	14	19	no words	no words
7	HP	4	11	15	no words	no words
8	HP	4	15	19	no words	no words
9	HP	4	8	12	no words	no words
10	HP	3	11	14	no words	no words
11	HP	6	13	19	no words	no words
12	HP	2	10	12	no words	no words
13	HP	5	15	20	no words	no words
14	HP	4	11	15	no words	no words
15	HP	5	10	15	no words	no words
16	HNP	4	11	15	no words	no words
17	HNP	2	11	13	no words	no words
18	HNP	4	11	15	no words	no words
19	HNP	4	10	14	no words	no words
20	HNP	3	16	19	no words	no words
21	HNP	3	13	16	no words	no words
22	HNP	5	23	28	no words	no words
23	HNP	3	13	16	no words	no words
24	HNP	3	12	15	no words	no words
25	HNP	4	13	17	no words	no words
26	HNP	3	11	14	no words	no words
27	HNP	4	11	15	no words	no words
28	HNP	4	9	13	no words	no words
29	HNP	4	11	15	no words	no words
30	HNP	4	13	17	no words	no words

HP = High Pictures

HNP = High No Pictures

Identi- fication Number	Group	Time Taken (in minutes)			Words Requested by Subjects	
		Book	Test	Total	Book	Test
31	LP	10	27	37	peddler, leaned	wares, popular
32	LP	9	25	34	no words	no words
33	LP	6	14	20	no words	no words
34	LP	6	15	21	no words	no words
35	LP	9	22	31	no words	no words
36	LP	8	14	22	no words	ordinary, wares, refreshed
37	LP	7	12	19	no words	no words
38	LP	10	27	37	no words	no words
39	LP	5	11	16	no words	no words
40	LP	9	16	25	ordinary, peddler, refreshed, peddler (again)	ordinary, bunch
41	LP	6	18	24	no words	no words
42	LP	6	10	16	no words	no words
43	LP	6	19	25	wares	ordinary
44	LP	6	19	25	no words	wares, refreshed, arranges
45	LP	6	19	25	no words	ordinary
46	LNP	7	21	28	no words	no words
47	LNP	6	20	26	no words	arranges
48	LNP	8	19	27	no words	no words
49	LNP	6	15	21	no words	no words
50	LNP	5	21	26	no words	no words
51	LNP	7	22	29	no words	wares
52	LNP	5	20	25	no words	headache
53	LNP	24	30	54	*peddler, carrying	**ordinary, wares
54	LNP	8	13	21	no words	no words
55	LNP	7	22	29	ordinary disturb	ordinary, wares, popular
56	LNP	9	13	22	no words	no words
57	LNP	7	18	25	tsz	no words
58	LNP	8	14	22	ordinary	no words
59	LNP	8	26	34	no words	no words
60	LNP	5	11	16	no words	no words

*wares, own, bunch, holding, upset, fifty, even, feel, hungry, slowly, great, nice, thought, against, straight, refreshed, right, branch, finally, shaking, fingers, them, only, tsz.

**different, bunch, refreshed, ordinary, held, leaned, knock.

LP = Low Pictures

LNP = Low No Pictures

APPENDIX E

SUBJECTS' RESPONSES TO PICTURES

SUBJECTS' RESPONSES TO PICTURES

Identi- fication Number	Group	Responses
1	High	looked quickly at all pictures before reading.
2	High	looked at 1/2 of pictures, very quickly at first 1/2 before reading, last 1/2 after reading.
3	High	looked at pictures very quickly after reading.
4	High	looked quickly at each picture before reading.
5	High	looked at 3/4 or more of pictures very quickly after reading.
6	High	looked at all pictures fairly quickly after reading.
7	High	looked at 1/2 of pictures, very quickly at first 1/2 before reading, last 1/2 after reading.
8	High	looked quickly at each picture after reading.
9	High	quick glance at 3/4 of pictures before reading.
10	High	didn't appear to look at pictures consistently, sometimes looked after reading.
11	High	looked quickly at pictures before and after reading each page.
12	High	looked at all pictures very quickly before reading.
13	High	looked at all pictures very quickly before and after reading, sometimes during reading of pages.
14	High	looked at all pictures quickly before reading.
15	High	looked at all pictures quickly before reading.
31	Low	2 seconds at each picture before reading, very quickly after each page.
32	Low	didn't look at first 1/3 of pictures, then started looking after reading.
33	Low	looked at all pictures very quickly before reading.
34	Low	first 1/2 of book looked at pictures quickly before reading, last 1/2 some after.

Identi- fication Number	Group	Responses
35	Low	1 second at each picture before reading, very quickly after each page.
36	Low	looked quickly at pictures after reading.
37	Low	first 1/2 of pictures looked at quickly before reading, last 1/2 quickly after.
38	Low	looked at pictures before reading.
39	Low	looked at all pictures quickly before reading.
40	Low	first 1/2 of pictures looked quickly after, last 1/2 mostly before.
41	Low	looked at most very quickly before reading, studied 5 isolated for 2-3 seconds before reading.
42	Low	first 1/2 looked very quickly before, last 1/2 didn't pay much attention to words or pictures.
43	Low	glanced very quickly at 3/4 of pictures after, didn't appear to look at some.
44	Low	glanced at pictures for first 1/2 after reading, last 1/4 looked before.
45	Low	quickly looked at pictures before reading each page.

APPENDIX F

RAW SCORES ON TOTAL RRCT AND SUBTESTS

RAW SCORES ON TOTAL RRCT AND SUBTESTS

Subject I.D.	Condition	Type of Reader	Total Test	Vocab- ulary Subtest	Syntax Subtest	Item Recall Subtest	Item Sequence Subtest	Interpre- tation Subtest	Evalu- ation Subtest
1	Picture	High	51	5	8	13	19	4	2
2	Picture	High	49	6	8	14	16	3	2
3	Picture	High	52	6	10	14	16	4	2
4	Picture	High	46	6	9	14	13	2	2
5	Picture	High	55	6	10	14	19	4	2
6	Picture	High	56	6	10	14	19	4	3
7	Picture	High	48	5	10	14	13	4	2
8	Picture	High	53	6	9	14	19	4	1
9	Picture	High	52	6	8	14	17	4	3
10	Picture	High	43	6	5	12	15	3	2
11	Picture	High	52	6	10	13	17	4	2
12	Picture	High	52	6	9	14	17	4	2
13	Picture	High	52	6	10	14	16	4	2
14	Picture	High	54	7	10	14	17	3	3
15	Picture	High	46	5	9	14	11	4	3

Subject I.D.	Condition	Type of Reader	Total Test	Vocab- ulary Subtest	Syntax Subtest	Item Recall Subtest	Item Sequence Subtest	Interpre- tation Subtest	Evalua- tion Subtest
16	No-Picture	High	48	5	7	13	17	4	2
17	No-Picture	High	54	5	10	14	19	4	2
18	No-Picture	High	52	6	9	14	19	3	1
19	No-Picture	High	50	5	10	13	17	3	2
20	No-Picture	High	31	4	4	13	6	2	2
21	No-Picture	High	52	6	9	14	17	4	2
22	No-Picture	High	48	6	7	14	16	3	2
23	No-Picture	High	47	4	7	13	19	3	1
24	No-Picture	High	53	7	8	14	17	4	3
25	No-Picture	High	48	5	6	13	19	3	2
26	No-Picture	High	50	6	8	14	17	3	2
27	No-Picture	High	51	6	9	14	15	4	3
28	No-Picture	High	51	6	10	14	16	3	2
29	No-Picture	High	50	5	9	14	16	4	2
30	No-Picture	High	51	6	7	14	19	3	2

Subject I.D.	Condition	Type of Reader	Total Test	Vocab- ulary		Syntax Subtest	Item Recall		Interpre- tation Subtest	Evalu- ation Subtest
				Subtest	Subtest		Subtest	Subtest		
31	Picture	Poor	44	3	7	14	15	3	2	
32	Picture	Poor	38	5	7	14	8	2	2	
33	Picture	Poor	38	5	7	13	8	2	3	
34	Picture	Poor	40	5	5	14	11	3	2	
35	Picture	Poor	29	3	7	10	4	3	2	
36	Picture	Poor	37	5	7	13	6	4	2	
37	Picture	Poor	38	5	7	13	8	3	2	
38	Picture	Poor	47	4	9	14	14	4	2	
39	Picture	Poor	27	3	6	11	3	3	1	
40	Picture	Poor	27	4	6	11	3	3	0	
41	Picture	Poor	46	5	5	14	17	4	1	
42	Picture	Poor	28	5	2	9	8	3	1	
43	Picture	Poor	38	5	4	13	10	4	2	
44	Picture	Poor	41	4	7	13	11	4	2	
45	Picture	Poor	46	3	8	13	15	4	3	

Subject I.D.	Condition	Type of Reader	Total Test	Vocab-		Syntax Subtest	Item Recall		Item Sequence Subtest	Interpre- tation		Evalu- ation Subtest
				Subtest	Subtest		Subtest	Subtest		Subtest	Subtest	
46	No-Picture	Poor	45	5	8	12	15	3	2			
47	No-Picture	Poor	35	3	4	14	8	4	2			
48	No-Picture	Poor	41	5	6	12	14	4	0			
49	No-Picture	Poor	28	3	5	10	5	3	2			
50	No-Picture	Poor	29	3	6	13	3	3	1			
51	No-Picture	Poor	45	5	8	14	12	4	2			
52	No-Picture	Poor	30	4	5	10	6	4	1			
53	No-Picture	Poor	31	3	6	10	8	3	1			
54	No-Picture	Poor	28	3	3	11	6	3	2			
55	No-Picture	Poor	18	4	2	5	6	1	0			
56	No-Picture	Poor	37	5	6	14	7	3	2			
57	No-Picture	Poor	29	3	5	11	4	3	3			
58	No-Picture	Poor	36	4	5	14	9	3	1			
59	No-Picture	Poor	32	4	6	12	6	4	0			
60	No-Picture	Poor	40	5	6	13	11	4	1			

APPENDIX G

SOURCES OF INFORMATION AVAILABLE TO
SUBJECTS ANSWERING RRCT QUESTIONS

SOURCES OF INFORMATION AVAILABLE TO
SUBJECTS ANSWERING RRCT QUESTIONS

Test Questions	Rater #1	Rater #2	Rater #3	Rater #4
* 1.1	gn,t	gn,t	gn,t	gn,t
* 1.2	gn,t	gn,t	gn,t	gn,t
1.3	t	t+p	t+p	t+p
1.4	gn	gn	gn	p,gn
* 1.5	gn,p	gn,p	gn,p	gn,p
* 1.6	gn,t+p	gn,t+p	gn,t+p	gn,t+p
* 1.7	t	t	t	t
* 2.1	t	t	t	t
* 2.2	gn,t	gn,t	gn,t	gn,t
2.3	gn	gn,p	gn,t	gn,t
* 2.4	t,bn	t,gn	t,gn	t,gn
* 2.5	t	t	t	t
* 2.6	t	t	t	t
* 2.7	t	t	t	t
* 2.8	t+p	t+p	t+p	t+p
* 2.9	t	t	t	t
* 2.10	gn	gn	gn	gn
* 3.1	t+p	t+p	t+p	t+p
* 3.2	t+p	t+p	t+p	t+p
3.3	t+p	t	t+p	t
* 3.4	t+p	t+p	t+p	t+p
* 3.5	t+p	t+p	t+p	t+p
* 3.6	t	t	t	t
* 3.7	t	t	t	t
* 3.8	t+p	t+p	t+p	t+p
* 3.9	t+p	t+p	t+p	t+p
3.10	t+p	t	t+p	t+p
3.11	t+p	t+p	t+p	t
* 3.12	t+p	t+p	t+p	t+p
* 3.13	t+p	t+p	t+p	t+p
* 3.14	t+p	t+p	t+p	t+p

* = complete rater agreement

t = text alone

p = picture or pictures alone

t+p = text and picture(s)

gn = general knowledge

Test Questions	Rater #1	Rater #2	Rater #3	Rater #4
4.1	t	t	t	t+p
4.2	t	t	t	t+p
* 4.3	t+p	t+p	t+p	t+p
* 4.4	t+p	t+p	t+p	t+p
* 4.5	t	t	t	t
* 4.6	t+p	t+p	t+p	t+p
* 4.7	t+p	t+p	t+p	t+p
4.8	t	t	t+p	t+p
* 4.9	t+p	t+p	t+p	t+p
4.10	t	t	t+p	t
* 4.11	t+p	t+p	t+p	t+p
4.12	t	t	t	t+p
* 4.13	t+p	t+p	t+p	t+p
* 4.14	t+p	t+p	t+p	t+p
* 4.15	t+p	t+p	t+p	t+p
4.16	t+p	t	t	t+p
4.17	t+p	t	t	t+p
4.18	t+p	t	t+p	t+p
4.19	t+p	t	t+p	t+p
5.1	gn	gn,p	gn	t+p
5.2	gn	gn	gn	t
5.3	gn	gn	gn	t
5.4	t	t	t	t+p
6.1	gn	gn	gn	gn, t+p
* 6.2	t	t	t	t
* 6.3	t+p	t+p	t+p	t+p

* = complete rater agreement
 t = text alone
 p = picture or pictures alone
 t+p = text and picture(s)
 gn = general knowledge

B30153